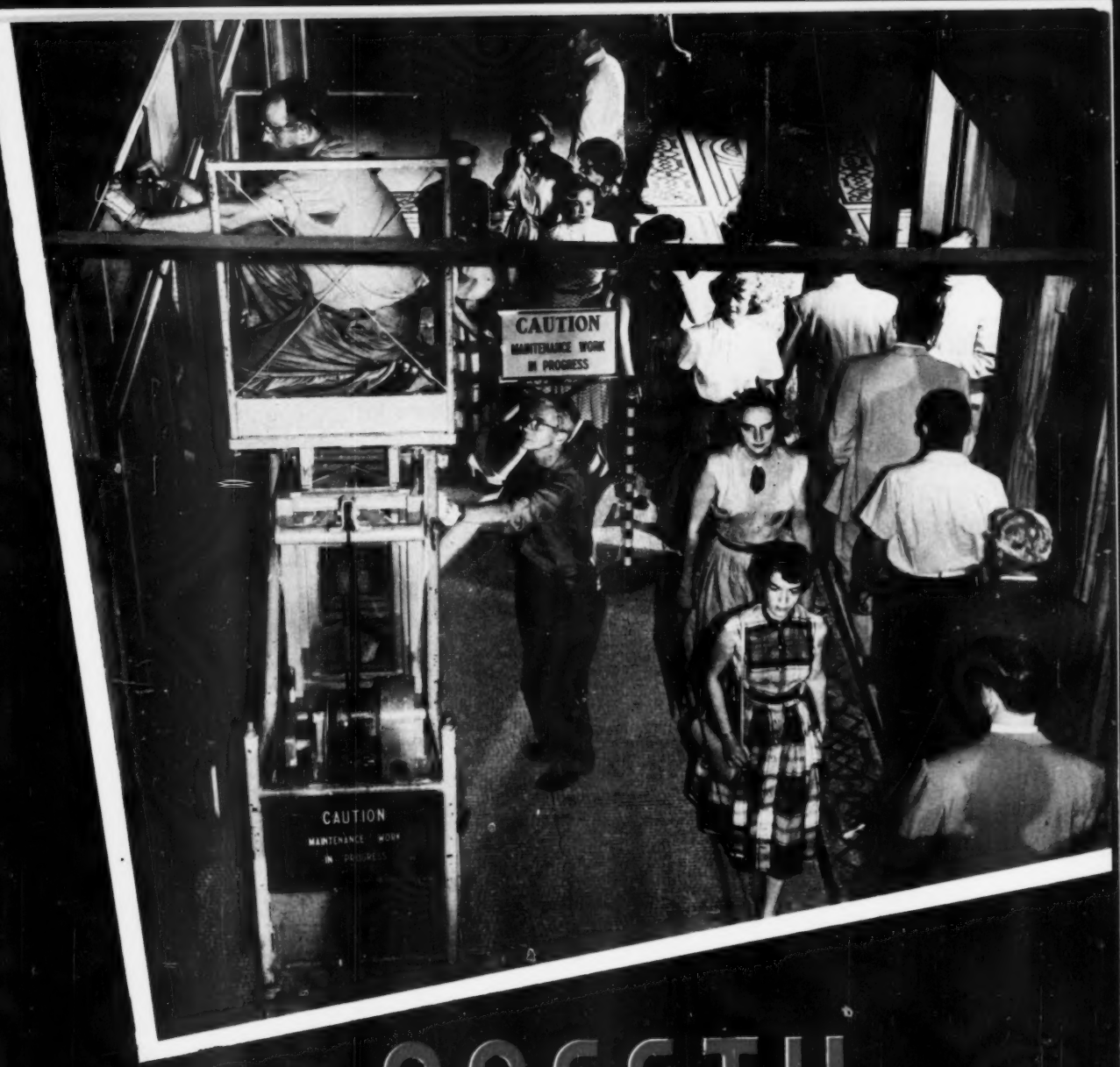


SAFETY MAINTENANCE & PRODUCTION

FORMERLY SAFETY ENGINEERING

AMERICA'S PIONEER MAGAZINE IN ITS FIELD

EST. 1901

JANUARY, 1952

FIFTY CENTS

Now . . . 2 New

AO COVERGLAS GOGGLES

Fit Over Safety
And Personal Glasses

NEW
Safety
Goggles

#326

#327

NEW – 4 WAYS!

1. New Cup Size and Shape
2. New Lens Size and Shape
3. New Side Shields
4. New Easy Lens Replacement

AO's newest development in eye protection—Chippers' and Welders' Coverglas Goggles—can be worn over practically every pair of personal glasses (even the biggest frames) and most types of safety prescription goggles *with and without side shield.*

Wider vision, too, because the lenses are larger and scientifically designed to give up to 20% more vision. Yet, with all these features the goggles weigh but a fraction of an ounce more than ordinary Coverglas goggles . . . cost only slightly more.

These goggles are the newest . . . and two of the greatest . . . developments since the advent of safety goggles. Get all the facts about these two outstanding Coverglas goggles from your AO Safety Products Representative. He can supply you.

QUICK FACTS

- Lens easily replaceable from rear (not front) by means of a spring clamp—no tools needed
- Lightweight, brown plastic cups fit face snugly, won't conduct heat or electricity
- Light-tight side shields for welders (on No. 327 goggle) provide indirect ventilation
- Bridge—High-grade leather. Instant adjustment
- AO worker-lab tests show much greater field of vision and increased comfort
- All-rubber headband, easily adjustable

"326" Chippers' Coverglas goggle supplied with regular Super Armorplate lenses. "327" Welders' Coverglas goggle supplied with regular Noviweld lenses and cover lenses.

AO's Industrial Vision Program Increases Production, Decreases Accidents. Write today for booklet "Improved Industrial Vision" to 1012 Vision Park, Southbridge, Mass.

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

(For full details, use Key # A-2 on free Inquiry Card on page 83)

Published by Alfred M. Best Company, Inc., Publication Office, Columbia Turnpike, Box 232, Rensselaer, N. Y., Editorial and General Offices, Best Building, 75 Fulton St., New York 38, N. Y. Entered as Second Class Matter at Post Office at Rensselaer, N. Y. Under Act of March 3, 1879. Subscription rates, $4.00 Per Year in the United States; $5.00 in Canada; Foreign, $5.00. Single Copies, 50 cents. Publication Date 1st.

only **HY-TEST** offers cushion insoles of long lasting Bol Tan

the touch test tells there's lots more comfort with the HY-TEST CUSH-EZE insole

Only Hy-Test Safety Shoes offer a resilient cushion combined with long-lasting Bol Tan leather insole. This gives built-in comfort. The cushion insole yields to foot pressure . . . gently . . . softly. Result? Real on-the-job foot comfort . . . all day long!

This cushion comfort is with you longer, too, because it's part of the Bol Tan insole construction, Bol Tan leather won't crack, split or curl . . . resists perspiration damage that steals life from most shoes.

HY-TEST SAFETY SHOES

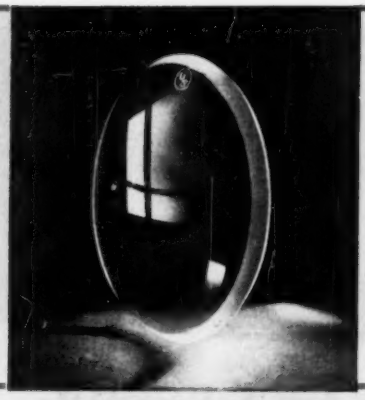
HY-TEST SAFETY SHOES

THE WORLD'S LARGEST SELLING SAFETY SHOE

NEW SAF-I-LENS

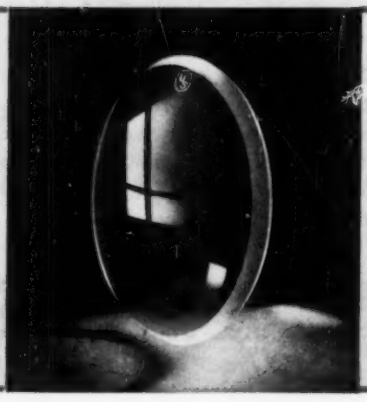
A Complete Safety Lens Program

Your Choice of 3 Lens Materials



OPTILITE A. This lens recommended as your first choice because its extremely hard surface offers greater resistance to abrasion. Lightweight, great strength and fine optical qualities assure employee acceptance. On jobs where pitting and spatter are encountered, will last ten times as long as glass. Exceeds Federal Specifications for impact-resistance. Highly resistant to acids and chemicals. Available in 6.00 curve, clear, in 44 MM or 47 MM drop oval eye sizes or 50 MM round.

OPTILITE B. This lens recommended as your second choice because of extremely *low* cost. Lightweight and excellent optical qualities assure employee acceptance. Meets Federal Specifications for impact-resistance and optical qualities. Available in 6.00 curve, clear, in 44 MM or 47 MM drop oval eye sizes or 50 MM round.



HARDENED SAFETY GLASS. For those who desire hardened safety glass we offer these lenses which are manufactured in strict accordance with Federal Specifications. Available in flat, 1.25 and 6.00 curve clear, 44 MM and 47 MM in drop oval or 50 MM round. Shades No. 1-2 or 3 available in 6.00 curve only.

Write for literature and prices

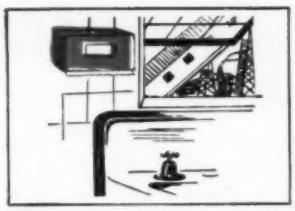
ALL LENSES FIT ANY STANDARD FRAME

UNITED STATES SAFETY SERVICE CO.

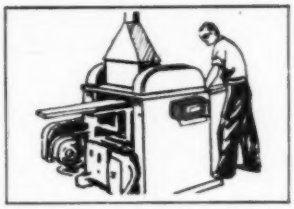
KANSAS CITY 6, MISSOURI — BRANCHES IN PRINCIPAL INDUSTRIAL CITIES

In Canada: PARAMOUNT, LTD., Toronto and Montreal

(For full details, use Key # A-4 on free Inquiry Card on page 83)



Mines like Anaconda use Magic wherever goggles get dirty and dangerous.

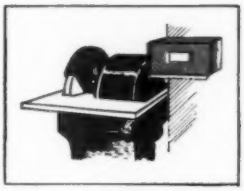


Mills like U. S. Steel use Magic wherever sparks fly or dirt and dust accumulates.

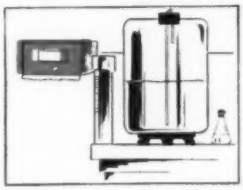
Refineries like Esso use Magic for welding and other maintenance jobs to overcome foul sight.

Manufacturers like American Can use Magic in production operations of every sort.

....THE BIGGEST SHEET THE BEST AND A BARGAIN



Precision producers like International Business Machines use Magic for absolute accuracy; perfect inspection.



Laboratories like Hanford Atomic use Magic because its superb quality meets the highest scientific standards.

Modern offices and engineering departments use Magic for convenience and better work.

●

Facts and Prices

MAGIC sheets are interfolded in sanitary Refill Packets. Each carton contains 6 Refill Packets (800 jumbo-size 5" x 6¼" super-strong sheets per Packet) at only $8.40 per carton. And the SELF-MOUNTING DISPENSERS cost only $2.50 each. All prices F.O.B. shipping point.

Throughout American industry, what such users save in accidents, poor production, time and money you can save.

Workmen's goggles and glasses stay dirty, dangerous and inefficient unless you make it *easy as possible to keep them crystal-clear.*

If you ask workmen to fuss with a cleaning fluid and a rag or ordinary fibre paper, time is wasted by this slow, old fashioned method and lint sticks to the lenses. If you supply a small, narrow treated sheet, it tears, and one sheet doesn't do the job. What you need is a big, wide, super-strong sheet. Each MAGIC sheet is 50% larger than usual . . . *yet each sheet costs you less.*

The paper is, without question, the finest that can be made; a combined development of the General Electric Company (Silicones Division) and ourselves. Polishes while it cleans. Lint-free. Loaded with sparkle-power. Science's answer to foul sight. Leaves an invisible coating of silicone which protects lenses; gives and preserves sparkling clarity, makes cleaning simpler, better, brighter, more lasting. All in one instant operation—and *easy as lifting your finger.* And all at a trifling cost.

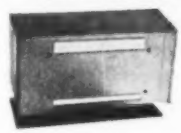
No cumbersome cabinet. No complicated dispenser. No fuss. No waste. No fluid. Nothing to squirt. Simple, attractive dispenser—not much bigger than a man's fists—contains no moving parts. Indestructible. And no other cleaning station has the SELF-MOUNTING feature. Compare these features and prices and decide. Buy a lot more safety and efficiency for a lot less money. Write us today or order through your Safety Supply house now!

The Silicone Paper Company of America, Inc.

The World's Largest Producer of Silicone Papers

Interfolded sheets—Flat sheets—Rolls ● 75 E. 45th St., New York, N. Y.

NO SCREWS OR DRILLS NEEDED... JUST STICK IT TO THE WALL



Exclusive feature! Notice Preset Adhesive Mounting Strips on back of Dispenser. They absolutely hold to machinery, metal, wood, glass, tile, steel beams, plaster walls or any smooth surface. No screws, nails, hammering or drilling. No skilled labor, time, trouble or installation cost. *Instantly installed anyplace.*

Magic Lens Tissue

T.M.REG. U.S. PAT. OFF.

SILICONE TREATED

(For full details, use Key # A-5 on free Inquiry Card on page 83)

"COLS-ALL PURPOSE" GLOVES

OUTWEARS UP TO

24

TOUGH
FLEXIBLE
LIQUID PROOF
WEAR RESISTANT

ABSOLUTELY FREE
Write on your company letterhead for free pair of sample gloves.

PAIR OF ORDINARY WORK GLOVES

"Cols-All Purpose" Vinyl coated canvas are made to fit into the picture wherever work gloves are needed. Their rough, tough ability to take it makes them the working man's favorite. Their long wearing qualities make them fast friends of the wearer. That's why you hear so many men tell the fellows on the job that they are the best gloves they have ever worn.

A Real All-Around Champion Work Glove

Also, ask your Jobber for Cols-All Purpose Work Gloves

COLUMBUS GLOVE MANUFACTURING CO.

1836 EAST FULTON STREET

COLUMBUS 5, OHIO

(For full details, use Key # A-6 on free Inquiry Card on page 83)

A NEW APPROACH IN EYE PROTECTION

JONES FULL VISION

VISOR GOGGLES

ONE-PIECE SHATTERPROOF PLASTIC LENS
(METHYL-METHACRYLATE)

FIT OVER EYEGLASSES for INDUSTRY and SPORTS

MEETS GOVERNMENT SPECIFICATIONS FOR IMPACT RESISTANCE AND OPTICAL QUALITIES

PAT. PEN.

CLEARVIEW VISOR GOGGLE No. 1

EXCLUSIVE

VISOR GOGGLES

FEATURES

- VISOR TOP STOPS GLARE from overhead light
- 100% VISIBILITY for greater safety and comfort
- FIT over LARGE frame GLASSES
- NO STRUTS or frame to obstruct vision
- NEW VISOR head band suspension for added comfort
- REPLACEABLE one-piece lens
- NEW down-angle lens
- INCREASED impact strength
- NO FOGGING—no pitting
- NO GLARE, distortion or reflection
- NEAT—smart—modern appearance
- SAFELY NON-FLAMMABLE
- LIGHT WEIGHT—cool comfortable
- ECONOMICAL to use

A NEW APPROACH IN EYE PROTECTION

GLARESTOPPER VISOR GOGGLE
MODEL No. 2

FOR GLARE PROBLEMS: Green opaque Visor stops GLARE from overhead lighting. LIGHT PALE GREEN ONE PIECE SHATTER-PROOF PLASTIC LENS reduces GLARE and REFLECTION from shiny metals, such as, aluminum, brass, copper, steel, chrome, silver, etc.

CLEARVIEW VISOR GOGGLE
MODEL No. 1A

FOR GENERAL USE: Green opaque Visor stops GLARE from overhead lighting. Relieves EYESTRAIN and reduces FATIGUE for greater efficiency.

NEW ONE PIECE SHATTERPROOF PLASTIC LENS with new down angle vision gives 100% unobstructed VISIBILITY for greater SAFETY and wearing COMFORT.

GLARESTOPPER VISOR GOGGLE
MODEL No. 3

FOR EXCESSIVE GLARE PROBLEMS: Foundry uses, open hearth work, pouring molten metal, reducing BRIGHT FLAMES, GLARES.

DARK SAGE GREEN ONE PIECE SHATTERPROOF PLASTIC LENS reduces GLARE and EYESTRAIN. Protects WORKERS' EYES from eye strain and reduces fatigue. Safely NONFLAMMABLE.

PRICES ALL MODELS

1-71	$2.25	Replaceable Lenses	$1.35
72-143	2.00	Cover Lenses	.20 EA
144	1.80		

Ski Goggles
Safety Goggles
Sun Goggles

JONES AND COMPANY • 125 CATLIN AVE. • RUMFORD, RHODE ISLAND

(For full details, use Key # A-7 on free Inquiry Card on page 83)

May the Spirit of Christmas,
the joy and laughter,
Remain in our hearts
through the long year after

WALTER G. LEGGE
New York

E. WILLARD MERRITT
New York

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Indianapolis

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Toronto

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Switzerland

Season's Greetings From the Legge men of America

F-1

Walter G. Legge Company, Inc., 101 Park Avenue, New York 17, N. Y.

The new plastic "707" Safety Goggle combines

Protection — Comfort — Appearance

PROTECTION — is still the basic purpose of this new style goggle. Its acetate frame has been designed to retain the safety lens even when subjected to severe impact. In addition to its general use throughout industry where eye hazards are encountered, the non-sparking "707" is especially suitable for use in chemical and electrical plants.

MODEL 707 PLASTIC FRAME SPECTACLE TYPE SAFETY GOGGLE

COMFORT — Wire core temples with cable wound ends permit easy adjustment for a snug, comfortable fit. This light weight goggle with large wide flaring nose pads receives the utmost in worker approval.

APPEARANCE — Flesh tint, high line temple, keyhole bridge and drop-eye shape combine for a distinctly personal look.

The "707" is available with flat, 1.25 or 6.00 curve, heat treated safety lenses.

Order Direct and Save!

PENNSYLVANIA OPTICAL COMPANY

READING, PENNSYLVANIA

Known for Fine Ophthalmic Products Since 1886

(For full details, use Key # A-8 on free Inquiry Card on page 83)

THE "SPECTACLE" TO SEE BEFORE YOU BUY!

the SAF-I-SPEC

NEW PATENTED TEMPLE ATTACHMENT!
Specially designed screw and metal end piece positively locks temple to lens. Lens can be changed almost instantly and no special tools are required.

Offers MAXIMUM "spectacle-type" IMPACT PROTECTION

- Modern attractive design—Striking appearance.
- Comfortable—lightweight—Velvet soft nose piece.
- Rugged—tough—Meets Federal spec. for impact.
- Lens made of Optilite ® Optically correct.
- Low original cost—Low cost replaceable lens.
- Employee acceptance—Feather-lite comfort.
- Lens also interchangeable with SAF-I-DUO, safety goggle.

Write for literature and prices.

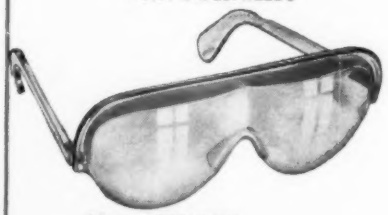
NEW IMPROVED TEMPLE DESIGN

Also manufacturers of the
SAF-I-SHIELD
SAF-I-FLEX
and
SAF-I-DUO
Safety Goggles

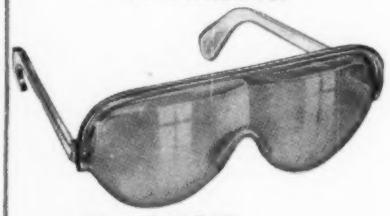
U.S. SAFETY EQUIPMENT & ENGINEERING SERVICE CO.

No. 241003
—ALL CLEAR

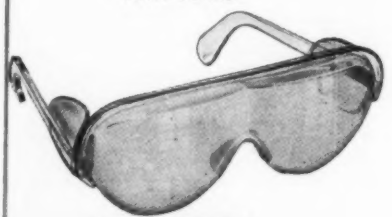
No. 242003
—ALL CLEAR
WITH SIDESHIELDS



No. 241503
—ALL CLEAR
WITH GREEN TOP



No. 241123
—ALL GREEN
ANTI-GLARE



No. 242123
—ALL GREEN
WITH SIDESHIELDS

UNITED STATES SAFETY SERVICE CO.

KANSAS CITY 6, MISSOURI BRANCHES IN PRINCIPAL INDUSTRIAL CITIES
In Canada PARMELEE, LTD. Toronto

(For full details, use Key # A-9 on free Inquiry Card on page 83)

GREATEST ADVANCE in EYE SAFETY

K-LENS-M

REG. U.S. PAT. OFF.

Liquid LENS CLEANING and ANTI-FOGGING

Brings Clear Safe Vision to Your Workers

Here's the modern way to promote the wearing of Safety Goggles. Install K-LENS-M Lens Cleaning Cabinets with K-LENS-M Anti-Fogging Stations, endorsed by Safety Engineers, to provide clean, clear safety goggles for your workers. K-LENS-M Lens Cleaner and K-LENS-M Anti-Fogging Liquid are used by leading manufacturing plants, packing houses, canneries, public utilities, government installations and business offices.

Easy-to-use, safe, EFFECTIVE ON GLASS OR PLASTIC.

Long-lasting K-LENS-M Liquid and Tissues are dispensed by a compact metal dispenser cabinet containing large bottles of K-LENS-M Lens Cleaner and K-LENS-M Anti-Fogging Liquid as well as lint-free tissue. Equipped with spray pumps and disposal space for used tissue.

Easy to install, use and service.

Also available for off-premise use in individual pocket-size plastic "Twinkit," containing a bottle of K-LENS-M *Lens Cleaner and a bottle of* K-LENS-M *Anti-Fogging Liquid.*

K-LENS-M . . . *Complete Lens Cleaning and Anti-Fogging Equipment*

THE WILKINS CO.
INCORPORATED
CORTLAND 2, N. Y.

Manufacturers of
K-LENS-M

Liquid Lens Cleaner
Lint-Free Lens Tissues
Anti-Fogging Liquid
Dispenser Cabinets
Anti-Fogging Station

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SAFETY MAINTENANCE & PRODUCTION

FORMERLY "SAFETY ENGINEERING"

The Magazine of Safety

A MONTHLY PUBLICATION DEDICATED TO ACCIDENT PREVENTION, MAINTENANCE, HEALTH CONSERVATION AND FIRE CONTROL FOR EFFICIENT PRODUCTION.
EST. 1901

VOL. 105, NO. 1 **JANUARY, 1953**

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★

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Our Thanks for the Courtesy
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AMERICA'S PIONEER MAGAZINE IN ITS FIELD

SAFETY MAINTENANCE & PRODUCTION is indexed regularly by Engineering Index, Inc., New York

PLEASE ACCEPT

this important new safety shoe catalog

with our compliments

Every safety executive needs this buying guide! Regardless of the make or type of safety shoes you have bought in the past, here are brand-new specifications — new styles, new materials, new constructions — designed to give you improved protection against specific foot and toe hazards, and save you money in the bargain! It will pay you to shop and compare against new Lehigh standards to be sure you're getting the biggest money's worth your safety dollars will buy.

UP TO THE MINUTE — COMPLETELY REVISED 16TH EDITION

Here are the very newest ideas in industrial foot protection: perspiration-proof inner soles; mildew-proof upper leathers; shoes stitched with Dacron, newest of the miracle fibers; an all-felt, cold-climate "Parka-Boot", Lehigh's exclusive, patented "Sock-Saver" toe lining, and many more. This comprehensive new catalog tells you:

WHAT SOLE TO USE —

A simple, easy-to-understand chart that clearly analyzes the advantages and disadvantages of 7 different types of soles against 9 major floor conditions.

WHAT SHOE TO CHOOSE —

Complete specifications on 58 different styles in safety shoes and boots — 5 smart styles for women; many brand new patterns not previously catalogued; most others completely revised, with important new features and details.

HOW TO SELL FOOT-SAFETY IN YOUR PLANT

Complete details on Lehigh's famous in-plant Safety Service — everything you need to help you cut down on foot and toe injuries, available at NO CHARGE.

write on your company letterhead or USE THIS COUPON

LEHIGH
SAFETY SHOE COMPANY
ALLENTOWN, PA.

LEHIGH SAFETY SHOE COMPANY • ALLENTOWN, PA.

Please send at once, without cost or obligation, _____ copies of your new Catalog No. 16B

Name _____

Title _____

Company _____

City _____ Zone _____ State _____

(For a copy of catalog, use Key # A-11 on free Inquiry Card on page 83)

It's Safe to Say

EDITORIAL PAGE

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★ ADDITION TO FAMILY

SAFETY meetings, indoctrination courses and accident prevention campaigns are a vital part of the never-ending crusade to control accident losses and personal tragedies. In this direction we have long felt that one of the most completely unsung heroes of our daily life is the qualified safety director who devotes his energies to saving that life itself.

It is equally true, however that the most efficient, fully trained safety engineer is not a centipede nor has he as yet learned to conquer space and be in more than one place at a time. For that reason a constant reminder directly to the employee that management has his safety at heart is necessary to assure the staff that accident prevention effort is not another managerial flash in the pan.

★ ★ ★

For a number of years there has been in existence a colorful, monthly booklet bearing the title, "Your Safety News" designed for distribution to the employees in all lines of industry. Effective with its January, 1953 edition, "Your Safety News" becomes an important part of Alfred M. Best Company, Inc., publishers of SAFETY MAINTENANCE & PRODUCTION. The former publisher, Frank O. Shoemaker, will continue to be associated with this organization as Editor of "Your Safety News" so that we can draw upon his long experience in publishing material expressly designed for the industrial worker on the direct firing line of accidents.

In order to give the rank and file a well-illustrated, colorful presentation of the manifold advantages of safety achievement, "Your Safety News" is written entirely for the workers' consumption. It covers all phases of accidents—those in the shop, in the home, at play and on the streets and highways, providing him with the necessary background better to understand the hazards of his work. Equally important is the fact that the material contained in that easily read publication will contribute immeasurably to better employee relations. Over a long period of time, nothing of a controversial nature which conceivably could offend or embarrass either management or labor has appeared in "Your Safety News."

★ ★ ★

Under the aegis of this organization, identified with safety since 1899, "Your Safety News" will round out our Safety Department by providing management with the means of distributing to its staff live material in the worker's own language. From a technical standpoint, the material is deliberately simple, but simplicity can be a potent selling tool and we know from long experience that safety must be sold day after day and year in and year out and thus requires all the selling tools at its command.

The facts that help to sell safety to the managerial staff won't necessarily sell it to the average man at the machine or bench. By broadening the appeal we build up the payoff represented by increased production, higher morale, lower insurance rates and most important, fewer personal misfortunes.

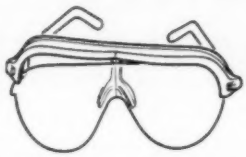
Accident prevention can be sold to the working staff by a bright, quickly read pamphlet distributed by management. By keeping the contents folksy, adding the grace note of humor, the safety message direct to the grass roots can be delivered with a nudge instead of a bludgeon. Thus the appeal of safety becomes a chat from boss to staff and results in enthusiasm instead of tolerance.

★ PLANT MAINTENANCE SHOW

JUST three years old, the largest convention in the maintenance field opens in the Public Auditorium, City of Cleveland, on January 19th.

For a full business week upwards of 15,000 world-wide delegates will hear outstanding authorities discuss the growing problems of plant maintenance and they will see several hundred booths showing products, equipment and devices designed to effect economies, lower accident risks and thus contribute to more economical production. H.A.

1¼ oz. BAL-spec Eye Shield



One-piece snap-in lens is extra large, affords wide field of vision, is formed to 6.00D curve. All-acetate frame is non-sparking.

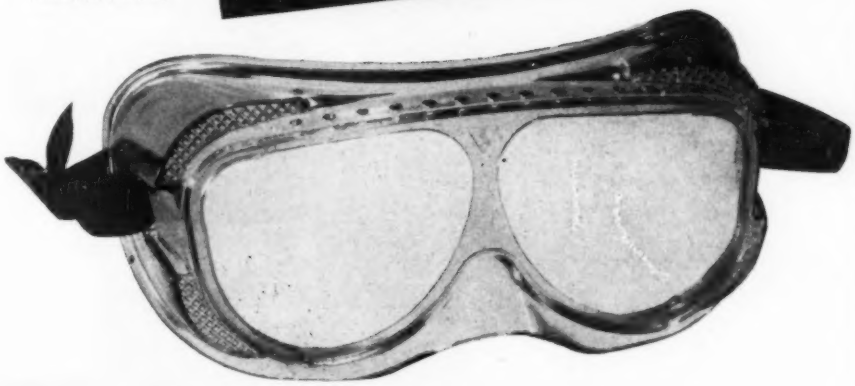
Ful-Vue temples provide unrestricted side vision, choice of flexible riding bow, or spatula which are especially liked by women because they don't muss hairdo.

1 BAL-spec All-Acetate Eye Shield

BAL-spec is especially suitable for supervisory personnel and plant visitors, and others who pass in and out of hazardous areas. Each BAL-spec Eye Shield is individually sealed in cellophane, may be repacked and sealed for re-use in polyethylene bags available from Bausch & Lomb. BAL-spec meets all U.S. Bureau of Standards tests for impact-resistance, of course.

THE 2 BEST ANSWERS
to low cost eye protection

1853 1953 INTO A NEW CENTURY OF OPTICAL PROGRESS
BAUSCH & LOMB CENTENNIAL



2 BAL-guard All-Acetate Eye Shield

Here is side and frontal protection without restriction to field of vision. BAL-guard is molded to fit any average face comfortably. It may be worn over regular glasses, or corrective safety glasses. BAL-guard meets all U.S. Bureau of Standards requirements for protection against impact, guards against dust or splash. Frame available in 2 shapes—wide and narrow—in clear, transparent green or opaque brown. Snap-in lens in clear or transparent green.

1¾ oz. BAL-guard Coverall

BAL-guard's unique 2-way ventilation insures a minimum of fogging. Roll-molded rims for extra comfort, extra structural support.

Crystal-clear snap-in lens is replaced in seconds. Lens area fits orbital cavity, is ideally shaped for full visual comfort.

BAUSCH & LOMB *Safety Eyewear*

WRITE TODAY for complete specifications and prices on these two great acetate eye shields. Bausch & Lomb Optical Co., 90513 Smith St., Rochester 2, New York.

(For full details, use Key # A-12 on free Inquiry Card on page 83)

No. 6 of a series of 6

ANSUL DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT

Besides getting the best in dry chemical fire protection equipment, Ansul users also receive a complete fire protection service without cost or obligation. Reprints of advertisements numbers 1 to 5 of this series give details. Write today for a complete set of these advertisements.

A SUMMARY OF *Extra Services and Plus Values* *available without cost to users of* ANSUL DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT *. . . . your Best Protection*

FOR FLAMMABLE LIQUID, GAS AND ELECTRICAL FIRES

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FRANCIS G. HOOD MEMORIAL BLDG., MARINETTE, WIS.

Send for your copy of file No. 648. You will receive a variety of helpful printed matter. Included is our latest catalog which illustrates and describes Ansul Fire Extinguishing Equipment of all sizes.

ANSUL *Chemical Company*

FIRE EQUIPMENT DIVISION • MARINETTE, WISCONSIN

OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES IN THE U. S. A., CANADA AND OTHER COUNTRIES
ALSO MANUFACTURERS OF INDUSTRIAL CHEMICALS, REFRIGERANTS AND REFRIGERATION PRODUCTS

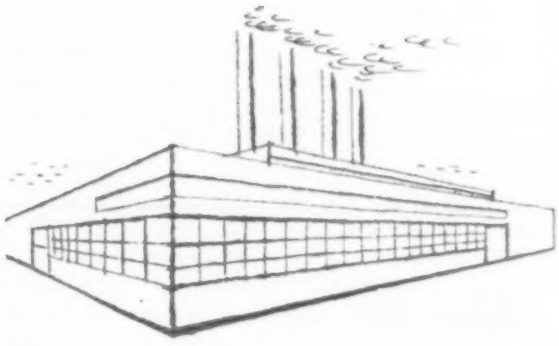
(For full details, use Key # A-13 on free Inquiry Card on page 83)

fourth plant maintenance conference

SAFETY MAINTENANCE & PRODUCTION

VOL. 105, No. 1 • JANUARY, 1953

The unique program of the maintenance conference will permit the answering of specific problems, will provide discussions of problems according to the type of industry and the size of plant, and will offer an extensive exhibit of maintenance equipment and materials.



A UNIQUE conference arrangement, to permit consideration of the problems of individual plants, will be a feature of the Plant Maintenance Conference, at the Public Auditorium, Cleveland, Jan. 19–22. An unprecedented effort will be made to permit every visitor to have his specific questions answered by experts from all major industries.

Facilities in panels, conferences and roundtables will make possible the treatment of approximately 5,000 individual problems, in addition to the reading of prepared papers and four plant tours. Eight sectional conferences and 21 roundtables will be held over two-day periods to encourage visitors to consider discussions overnight and submit questions based on their own experiences.

Separately, on the floor of the Plant Maintenance Show, which will be held at the same time, about 1,500 experts representing 300 exhibitors will be on hand to answer further questions concerning equipment.

Eleven major industries will have sessions of their own to allow intensive discussions of single industry problems. Also, conferences will be divided into separate groups according to the size of plant. Top management maintenance problems, common to all industry, will be treated in panels which all will attend.

Advance registration cards may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

MAINTENANCE CONFERENCE PROGRAM

Monday, Jan. 19

10 a.m. Opening. L. C. Morrow, consulting editor, "Factory Management & Maintenance," General Chairman, Plant Maintenance Conference.

"Maintenance Essentials," planning, scheduling, costs, budgets, training workers and supervisors, work standards and measurement.

8 p.m. Sectional Conferences, all held simultaneously.
"Organization."
"Operating Policies."
"Preventive Maintenance."
"Maintenance of Buildings."
"Maintenance of Electrical Equipment."
"Maintenance of Mechanical Equipment."
"Maintenance of Power Plant Equipment."
"Corrosion Prevention and Control."

(Continued next page)

Maintenance Conference Program

(Continued)

Tuesday, Jan. 20

9:30 a.m. Sectional Conferences, all held simultaneously.
- "Maintenance in Small Plants" (Up to 50 maintenance employees).
- "Maintenance in Small Plants" (51–100 maintenance employees).
- "Maintenance in Medium-Size Plants" (101–300 maintenance employees).
- "Maintenance in Medium-Size Plants" (301–800 maintenance employees).
- "Maintenance in Large Plants" (over 800 maintenance employees).
- "Problems in Plant Engineering" (Up to 100 maintenance employees).
- "Problems in Plant Engineering" (101–800 maintenance employees).
- "Problems in Plant Engineering" (over 800 maintenance employees).

2 p.m. Roundtables, all held simultaneously.
- "Area vs. Centralized Maintenance."
- "Dealing With Union Labor."
- "Incentives and Work Measurement."
- "Lighting."
- "Lubrication."
- "Project Control."
- "Pumps and Piping."
- "Sanitation."
- "Selling Management on the Maintenance Program."
- "Maintenance Stores."
- "Maintenance in Automotive Plants."
- "Maintenance in Chemical Plants."
- "Maintenance in Electrical Manufacturing Plants."
- "Maintenance in Food Processing and Packaging Plants."
- "Maintenance in Foundries."
- "Maintenance in Paper Mills and Paper Product Plants."
- "Maintenance in Petroleum Refining Plants."
- "Maintenance in Printing and Binding Plants."
- "Maintenance in Rubber Goods Plants."
- "Maintenance in Steel Mills and Fabricating Plants."
- "Maintenance in Textile Plants."

8 p.m. "Growing Pains of an Engineering-Maintenance Organization." A panel discussion featuring five speakers.

Wednesday, Jan. 21

9:30 a.m. "Maintenance Essentials." A second session of the panel discussion which starts Monday.

2 p.m. Roundtables. Second sessions of the 21 roundtables which start Tuesday.

7 p.m. Plant Maintenance Banquet.

Thursday, Jan. 22

8 a.m. Visitors will have a choice of four plant tours to be conducted by maintenance heads of each.

Best's

Safety & Maintenance Publications

Visit Booth No. 1503

at the

Plant Maintenance Show, Public Auditorium,

Cleveland

Alfred M. Best Company, Inc., 75 Fulton St.,

New York 38, N. Y.

The sign in this picture applies not only to the machine operator, wearing safety glasses, but to employees or visitors entering area.

"No Accident" Records Are Not Accidental

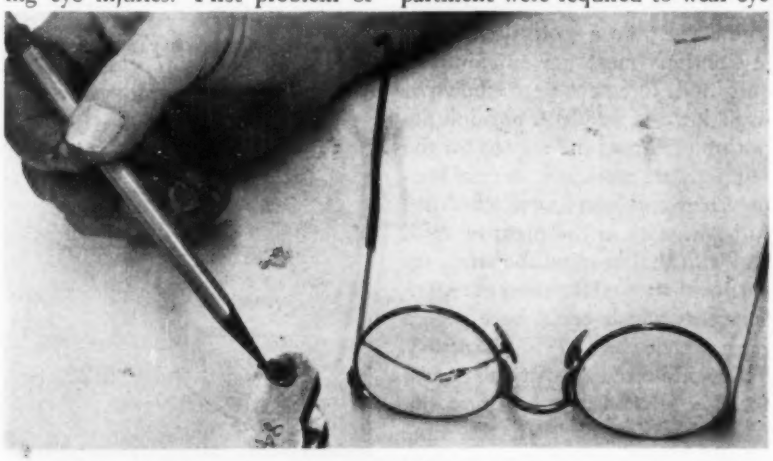
There is no magic way to stop accidents. It takes a carefully-planned, relentlessly-pursued program, using different approaches to safety and reaching employees from top to bottom. Here's how one company did it.

IT IS no accident that Whirlpool Corporation has reduced lost time accidents 55 percent during the first 9 months of 1952, as compared with the same period a year ago. The achievement was planned well in advance. The safety consciousness which employees now possess did not just happen, either. It is all part of a definite program in which everyday common sense plays a vital role.

Increased emphasis on safety began early in 1951 when safety officials noted an alarming increase in eye injuries. Although many of these injuries occurred to new workers unfamiliar with their work, experienced workmen were also receiving eye injuries. First problem of the safety department, then, was to ferret out the cause of the sudden rise in injuries.

Safety officials tabulated the 1950 lost-time injuries, department by department, as the first step. When this was done they checked every job in each department to see if it constituted an eye hazard. If a job was considered hazardous, the operator was required to wear eye protection while on the job. If 75 percent or more of the machines in any department were considered dangerous, all employees in that department were required to wear eye protection. This was necessary because of the continuous movement of workers within certain departments. For example, research disclosed that 75 out of 95 machines in the automatic washer and ironer machine shop department were dangerous. As a result, all employees in the entire machine shop area were required to wear safety glasses while in that department. This included

Employee holds torn safety-shoe that prevented injury to his foot when a dryer bulkhead, weighing 50 pounds, fell on it. He had won the shoes in a safety contest earlier.



This cracked pair of safety glasses bears mute evidence to the importance of wearing eye protection in dangerous work areas. The pencil points to the place where a piece of bushing flew off and struck the glasses. The operator wearing them was uninjured.

An eye-catching sign erected above a plant entrance serves as a constant reminder to all employees entering the building to be more safety conscious. Every few months the signs should be reworded so workers don't take the message as part of the scenery.

other plant personnel as well as visitors passing through the department. Signs indicating that this was a 100 percent eye protection area were posted at the entrance to the department.

Results of the eye protection program indicate that a tremendous improvement has taken place. There were 17 lost-time eye injuries in 1950, and only 9 during 1951. For the first 9 months of 1952, only 2 employees in the entire plant have lost time due to eye injuries.

When the eye protection program began it was very difficult to impress employees with the necessity of wearing safety glasses. A few cases of injuries avoided by wearing safety glasses were given wide-spread publicity through the employee magazine and posters strategically placed around the plant. These cases served as dramatic reminders to employees to wear their safety glasses while on the job. One old timer had run a milling machine for 17 years without any type of protection and had never been hurt. Within 3 weeks after he consented to wear eye protection, the lenses in his safety glasses were completely shattered by a broken tooth from a cutting wheel. Needless to say, he quickly became a confirmed believer in "Safety—*First*."

Another near injury occurred when a fragment of bushing on a machine fixture flew off while being ground and struck the operator's safety glasses. Had it not been for the safety glasses he would surely have lost an eye. The bushing and broken glasses were immediately photographed and used on a poster distributed throughout the plant to re-emphasize eye protection.

In January, 1951, a foreman training program was initiated parallel to the one on eye protection. In an orientation meeting, superintendents and foremen were shown a breakdown of accidents and injuries during 1950, and the reasons for the injuries were explained. Several hundred new employees were scheduled to begin work in the plant in 1951, and with that in mind the safety department stressed the most prevalent accidents which could be expected from reviewing 1950 statistics. These indicated a particular need for close supervision of all new employees by foremen. In the same meeting, the eye protection program was outlined to the foremen and they were instructed to pass the information on to their own department employees.

Safety Program Expands

Following the first foreman training meeting, a series of meetings was held throughout the year which included lectures, safety talks and training films developed by an industrial psychologist. In addition, several foremen were sent to the Michigan State Safety Conference in the fall of 1951. Throughout the year foremen were sent to various programs sponsored by the local safety council, which included slides, sound movies and lectures on industrial fire prevention, eye injuries, promoting safety on the job and several other safety topics.

Monthly safety meetings were held throughout 1951 with superintendents and foremen in each division. Top management personnel also kept abreast of safety developments by attending these meetings. The cause, effect and possible recurrence of accidents that occurred during the month were discussed. Any hazards which had been observed were discussed and acted upon. Their success has caused these meetings to be continued throughout 1952 on a monthly basis. The present meetings begin with a film on factors in human behavior. After watching the film, employees are asked to fill out quiz sheets covering safety points illustrated in the film. A discussion period follows, and any debatable answers to the quiz questions are

(Continued on page 52)

Safety shoes are an important part of any safety program. So is the safety record of each employee kept on the bulletin board.

CORD-ON-END "ZEBRA" Soles and Heels

Armortred

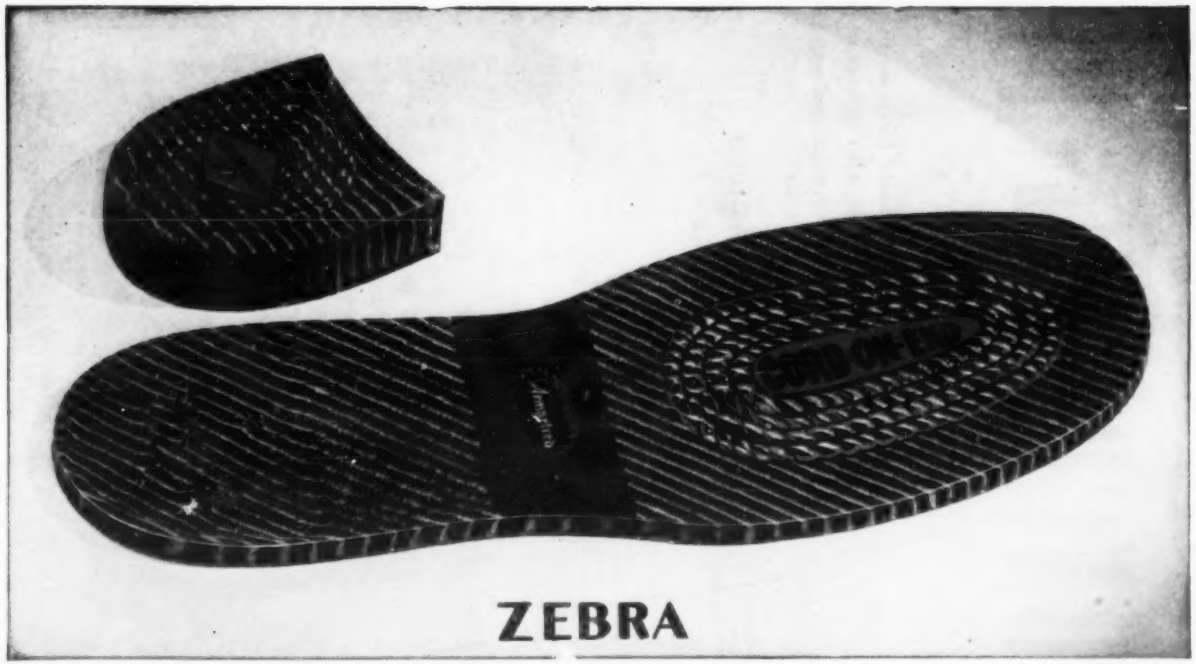
of course

THIRD OF FIVE

An Outstanding Product by QUABAUG

Special long-wearing and non-slip features Made in 12 and 18 iron.

Colors
Black Zebra
Brown Zebra
MacTavish



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MANUFACTURED AND DISTRIBUTED BY **QUABAUG RUBBER COMPANY** NORTH BROOKFIELD, MASSACHUSETTS

CONCRETE FLOORS:

Here are some basic facts on the laying, use and care of concrete floors, along with information on conductive, spark-resistant, corrosion resistant and non-slip types of concrete surfaces.

FEATURE

This is the third of three feature articles on Flooring Materials. The first two articles, dealing with conductive flooring and safety treads, appeared respectively in the November and December issues of SAFETY MAINTENANCE & PRODUCTION.

By PAUL SAINT-AMOUR
The Master Builders Co.
Cleveland, Ohio

WITH today's universal acceptance of concrete for industrial flooring, this discussion is an effort to present briefly the essentials of good practice for producing high quality concrete floors. The materials and processes available for obtaining heavy-duty, static-disseminating spark-resistant, corrosion resistant, colored and non-slip types of concrete floors are also discussed.

It has been said that "the serviceability and even the life of a building depend primarily on its floors" * because they are subject to the greatest wear. Concrete when used for floors does not differ essentially from concrete used for any other purpose, but certain special qualities are required.

The vital part of a concrete floor is its surface. Strength and wear-resistance of the surface practically determine the useful life of the floor, although a hard surface on a weak slab of poor quality obviously may fail. The quality of a floor is directly dependent upon: the careful selection of materials; qualified, experienced supervision; and good workmanship—throughout the whole job.

Why and How Floors Wear

The first requisite of the finished

For detailed description of flooring products, see pages 321–336 of "Best's Safety and Maintenance Directory" 1952–53 edition.

* Portland Cement Association.

Fig. 1. Illustration shows appearance of recommended consistency of concrete mix for high quality floors. Mix must be somewhat stiffer than ordinary concrete.

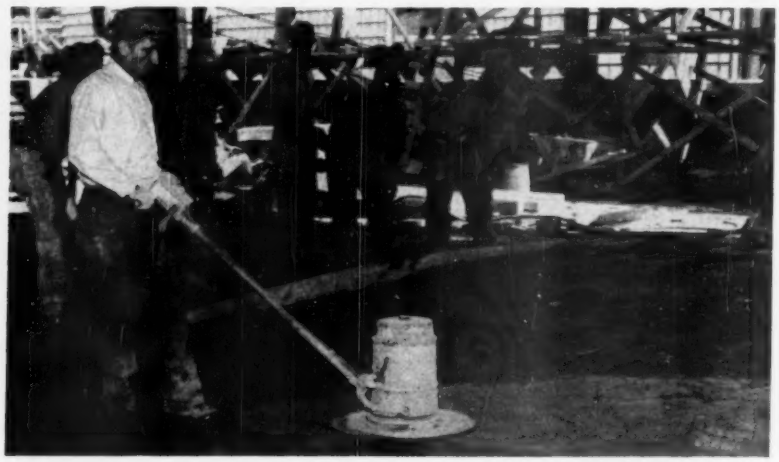


Fig. 2. Power float is being used in this picture to finish concrete floor. The use of this type of machine is recommended so that stiffer mixers can be placed and time saved.

HOW TO LAY AND MAINTAIN THEM

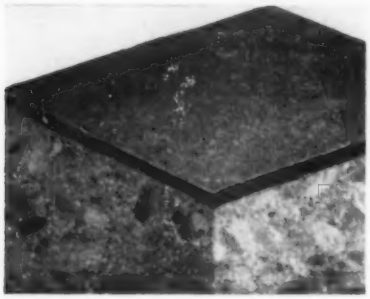


Fig. 6. Cross-section of a heavy-duty floor. One-eighth inch of metallic particles are shown at the surface of the concrete floor slab. Ductile, malleable aggregate is used in place of the brittle sand and stone.

floor is resistance to abrasion. Resistance to abrasion is, to a large extent, dependent upon the smoothness of the surface of the floor. The wear-resistance therefore depends upon the capability of the floor to receive a good finish. In turn, this is related to the workability of the mix. Wear resistance is also affected by the nature of the materials in the mix, and of course, by the type of traffic.

Much of the breakdown of floors is due to impact. No floor is an absolute plane nor are the wheels which pass over it. Foot traffic obviously involves impact. When truck wheels pass over an inequality or irregularity of the surface there is a drop. The effects of impact are to break down the mortar, to chip out the aggregate and to shatter brittle aggregate. As this process continues the irregularities in the surface are aggravated so that greater impact forces are created and the deterioration of the floor proceeds at a rapidly increasing rate.

Mixing, Placing, and Finishing

The basic principles of making good concrete are as applicable to cement floors as they are to all other concrete, but are perhaps even more important for floors because of the severity of service they withstand. The fundamental consideration is the production of a workable mix with a low water-cement ratio.

In concrete floors strength is probably more important than in most other concrete, even including structural members. Fortunately, the placing of floors is not as difficult an operation as placing most other concrete, so drier mixes can be used. It should be noted that the placing of dry mixes does not, as might be expected, add to the cost of the floor, but actually provides a saving. Although more labor for the actual placing is required, the finishing operations can be started quite a bit earlier—decreasing the total man-hours of labor required. The savings are greater where machine-floating and possibly machine-trowelling are

Fig. 5. The application of a "dust coat" or "shake" can improve floor quality if proper materials and procedures are used.

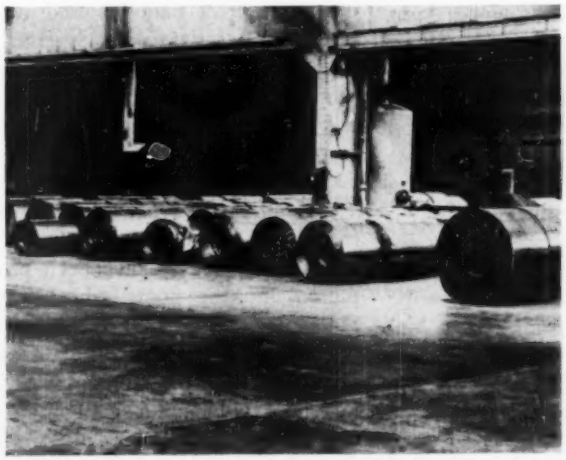


Fig. 3. Picture shows concrete floor in the shipping area of a steel company. The floor has been metallic hardened to resist wear.

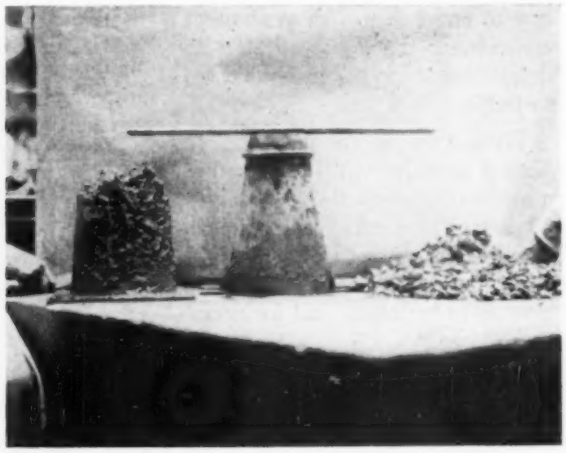


Fig. 4. Concrete floor mix on right is far too wet. Slump is 8 inches. Sample on left has slump of 3 inches, which is just right.

used.

Finishing operations require special care. Floating and trowelling bring water and excess small particles ("fines") to the surface, which produce low strength and high volume change at the point where most resistance to wear is needed. Overworking must be avoided. The mix must be sufficiently cohesive so that it does not segregate or bleed and it should contain a minimum of fines. Water in the mix should be cut down so that the "slump" is two to three inches.

At one time it was common but not good practice to lay floors with a rather wet mix and to dust on the surface a "shake" of neat cement to dry them. The object was to shorten the time between placing and finishing, but the result was an excessively rich mix at the surface, which led to crazing and cracking. If, however, the floor is laid with a reasonably dry mix, and a "shake" of cement and aggregate in proper proportions is used, the surface of the floor is improved instead of impaired. Strength and wear resistance are increased. This practice permits earlier finishing, and facilitates the finishing operation by providing a more workable mix at the surface.

Curing

Other things being equal, the quality of any concrete depends upon adequate curing. The results of inadequate curing become apparent much more rapidly in the case of floors than with most other concrete, as the floor will start to deteriorate as soon as it is subjected to traffic.

To cure concrete it is necessary to keep it saturated with water and at a moderate temperature for at least 10 days. The lower the temperature the longer the time required for curing. Curing below 50°F. is so slow as to be impractical for floors.

To obtain an adequate temperature in cold weather, it is somewhat helpful to heat the water and possibly the aggregates of the mix before placing. However, heating of the mix is usually not very effective, because the large surface area of a floor permits the mix to cool rapidly. The floor should be enclosed and not exposed to the weather. When the outside temperature is below 50°F. artificial heat should be provided for the curing period. Salamanders should not be placed on the floor surface itself, as this results in drying out some areas and giving inadequate heat to others. Salamanders also give off fumes which

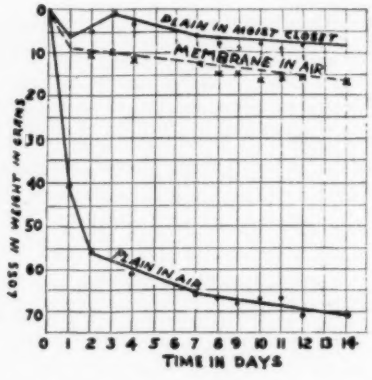


Fig. 7. Graph shows the effectiveness of a good membrane curing compound in keeping the moisture in a concrete slab. Specimens treated with the curing compound have moisture losses only slightly greater than those for perfect curing. Losses represent an insignificant part of the total water in mix.

may chemically attack the cement at the surface of the floor. Accelerators and high early strength cement will shorten the curing period and are helpful in cold weather.

Methods of maintaining water in contact with the cement in the floor include: pounding, sprinkling, and covering with sand, burlap, straw or waterproof paper. Curing with a membrane curing compound is the most widely used method. The curing efficiency is very high for a good quality curing compound. See chart illustration No. 7. Membrane curing is less expensive than curing with paper, and probably less expensive than most other methods of curing when the labor involved in carrying them out properly is taken into consideration.

Floor Hardeners

Floor hardeners can be divided into three basic types: (1) Integral treatments, (2) Liquid chemical surface treatments, (3) Integral surface treatments (done at time of floor laying).

1. Integral Treatment Floor Hardeners. Various materials may be mixed with the concrete or topping mix at the time of placing. Some of these function by reducing the quantity of mixing water required, thereby producing higher strength concrete. This water reduction should not be accomplished at the cost of excessive air entrainment. Other materials combine chemically with various components of the concrete to increase hardness.

2. Liquid Chemical Surface Treatment Floor Hardeners. If the fundamental rules in making, placing, finishing and curing the concrete have not been observed, dusting of the floor surface may occur. Sometimes the floor may be improved by applying some material to assist in hardening and binding the surface. These treatments are not cure-alls for poor materials or careless workmanship and will not make a perfect wearing surface of a poorly built floor. Magnesium fluosilicate, zinc fluosilicate, sodium silicate, aluminum sulphate, zinc sulphate, Chinawood and linseed oil, and various gums, resins and paraffins can be used for this purpose. Sometimes paints are applied after these treatments as further protection.

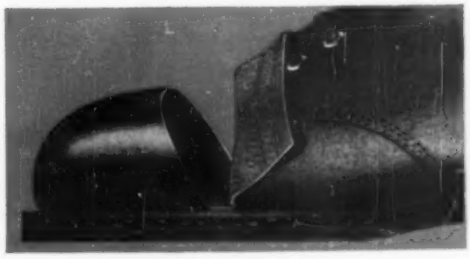
The fluosilicates of zinc and magnesium dissolved in water have been used with good success. Either of the fluosilicates may be used separately, but a mixture of 20 percent zinc and 80 percent magnesium appears to give the best results. Properly proportioned and prepared mixtures are available commercially. Care must be taken during and after application to prevent white stains from being formed.

Liquid hardeners have been promoted on good floors, where they serve no purpose, by the device of scratching a new floor surface. Drawing a sharp instrument over a new floor will cause a small amount of dust to rise, but this is perfectly natural and does not necessarily indictate any *(Cont'd on page 24)*

These Two Safety Work Shoes are identical except-

one is 45+% STRONGER

Your workers' toes will have 45+% more protection when you select the shoe on the lower right. This safety shoe contains WINGUARD 500 — the *safest* steel toe — designed to give maximum protection and comfort. WINGUARD safety steel toes were recently subjected to both compression and impact testing by one of the country's leading metallurgical testing laboratories and conclusively proved to average 45+% stronger and safer than non-WINGUARD steel toes otherwise identical.



WINGUARD 500 — for the rough and tumble work shoes that have to fight back against heavy odds. Its wings — secret of its greater strength — brace the steel toe against rearward tilting under impact. Its added supporting surfaces resist outward spreading under critical pressure.

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(from page 22) deficiency in the floor. When a floor is hard trowelled a thin skin of cement is brought to the surface and will dust on scratching. This film is soon worn off and does no harm. Application of magnesium fluosilicate or similar hardener will reduce the rate of wear of this surface film, but sooner or later the film will wear off and the total amount of dust produced remains the same.

Surface hardeners of the chemical type, which react with the lime of the cement, applied to the floor after it has hardened, have no value when the floor has been properly designed and installed. They are effective in improving, temporarily, defective floors. Film forming treatments may be of some benefit in improving resistance to corrosion but are only temporary, requiring frequent renewal.

3. Integral Surface Treatment Floor Hardeners. Metallic, silica sand, carbide, emery, traprock and other wear-resisting aggregates (mixed with cement and other ingredients) may be applied in "dust coats" or "shakes" to the level, floated surface of freshly placed concrete. These will all improve wear-resistance of the floor to a degree for some types of wear. However, laboratory tests indicate that the harder the material the less resistance to impact. There seems to be a direct relationship between hardness and brittleness.

Metallic Aggregates for Heavy Duty Floors

The value of metallic aggregates lies in the fact that the brittle siliceous aggregate in the surface of the floor is replaced by a ductile, malleable aggregate. Therefore impact tends to flatten instead of shatter the aggregates. The metallic aggregate in the floor surface is flattened under traffic tending to close up pores, even out irregularities, and produce a floor surface which is worn away only very slowly. (See Fig. 6.) The hardener is applied in a "shake" containing portland cement, iron particles (which must be chemically pure, oil-free and carefully size-graded) and other materials. At the time of application, the concrete should be stiff enough to prevent the metallic particles from sinking below the surface.

Some of these metallic aggregates can be applied up to 1¼ pounds of iron per square foot, which results in a layer of iron particles about ⅛ of an inch thick. A floor with this weight of hardener will wear from 5 to 10 times longer than the best plain concrete floors. To produce this heavy-duty floor, it will be found that generally, a cement-dispersing agent must also be present in the "shake" to provide the needed workability.

Colored Floors

Most industrial concrete floors are designed primarily for utility, and appearance is not an important factor. In offices, showrooms, cafeterias, rest rooms, and other similar locations it is sometimes desirable to have the decorative effect of color. In certain industries color serves a practical purpose in showing up material spilled on the floor: for example, in powder plants. Color is also used to mark aisles or hazardous areas around machinery.

Concrete floors can be colored by painting or other surface treatments. These are at best temporary. To produce a long-lived and satisfactory colored floor, the color should be incorporated in the concrete itself.

There are two general methods of producing colored concrete floors. One is to incorporate color throughout the floor slab. It is generally used only in two-course construction, with the color in the topping mortar, as the incorporation of color throughout the thickness of a monolithic floor would be prohibitively costly. The other method consists in the application of a colored shake made up of pigment, aggregate and cement. This method has the advantage of much lower cost since the required amount of color, the most expensive ingredient, is much less. Further, it can be applied to less-expensive monolithic floors, as well as two-course floors. It is also possible to secure better color, and finishing is easier. By selection of a suitable aggregate for the "shake," preferably metallic, a much more wear-resistant surface can be produced. There is a limited selection of pigments which are suitable for use in concrete, so the variety of colors is limited. A suitable finish

(Continued on page 56)

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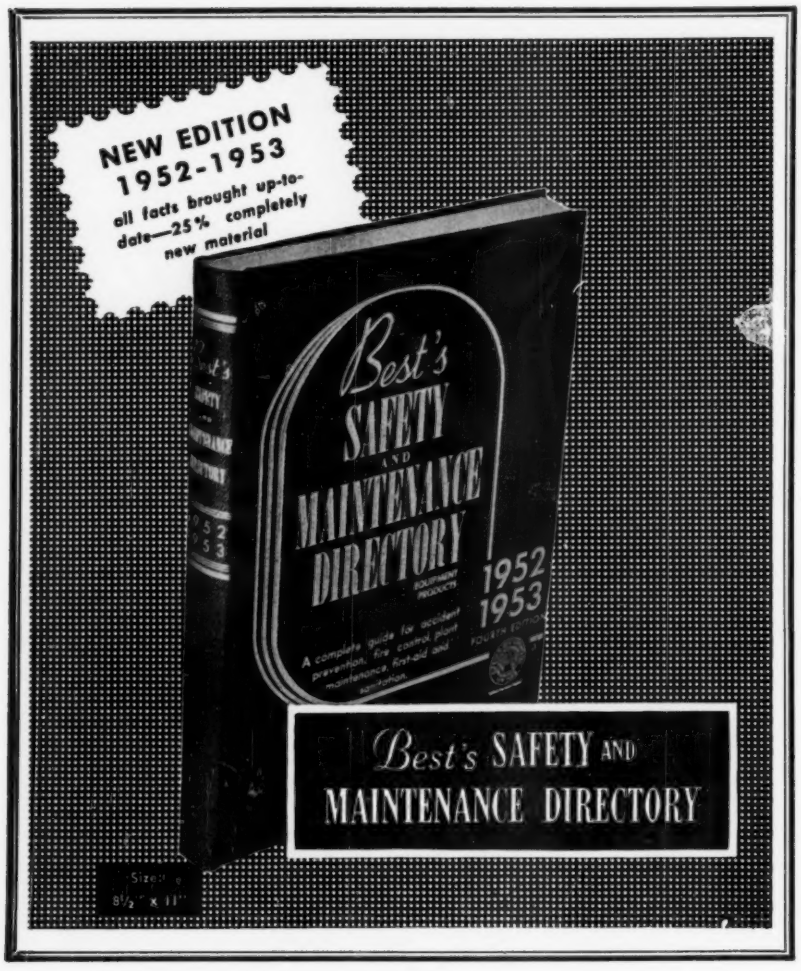

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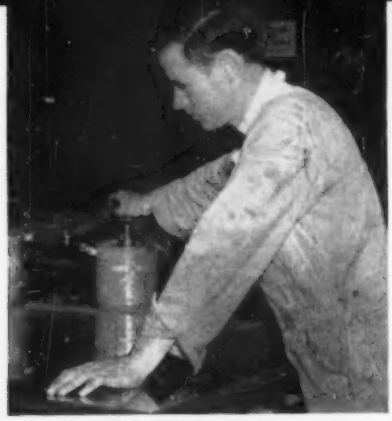
Illustration shows a safety can used to transfer a small quantity of flammable liquid. Only a properly-trained employee, who knows the hazards involved, should do this.



Note safety dispenser used by man cleaning aluminum sheeting with a flammable liquid.

For detailed description of flammable liquid transfer products see pages 77–83 of the 1952–53 edition of "Best's Safety & Maintenance Directory."

HOW TO TRANSFER FLAMMABLE LIQUIDS

Three factors combine to meet the dangers of transferring flammable liquids: trained personnel, using proper safety devices, applying a definite set of rules to the procedure.

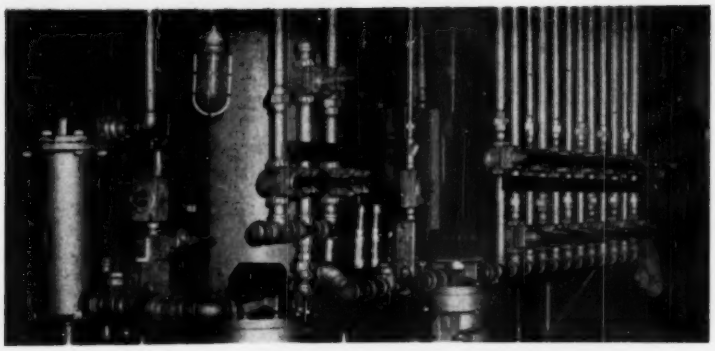
FLAMMABLE liquids are being used more extensively today than at any time in the industrial history of the country, resulting in a material increase in the hazards inherent to many operations, warns the Factory Insurance Association.

Through the use of volatile solvents in many industrial processes, it has been possible to increase production and improve quality. Solvents which readily evaporate generally permit greater production rates than those which are less volatile. In most cases, solvents having desirable qualities from a production standpoint are flammable in nature and require special precautions in handling.

Some plants customarily require

TEN RULES FOR SAFE TRANSFER OF FLAMMABLE LIQUIDS

1. **Maintain positive control over flow of flammable liquids from all transfer systems.**
2. **Provide pumping equipment of a type approved for liquids being handled.**
3. **Use drum pumps and safety cans for handling small quantities of flammable solvents.**
4. **Operate pumps only when liquid is being withdrawn from system.**
5. **Train thoroughly all employees charged with operation of flammable liquid dispensing facilities.**
6. **Provide emergency shut-off valves upstream of all self closing draw-off faucets on containers.**
7. **Adequately ground all flammable liquid transfer systems, including receiving container.**
8. **Provide heat actuated quick-closing valves for flammables when flow must be stopped fast.**
9. **Keep flammable liquid pumps and piping out of basement, tunnels, trenches and other below grade areas.**
10. **Arrange controls to stop flammable flow on failure of "human element", electric power or other actuator.**



Automatic metering equipment and shut-off valves feature this fuel transfer system.

the storage of small quantities of a considerable variety of flammable solvents. In such cases, purchase in bulk quantities may be impractical necessitating handling in drums and smaller containers. It is usually found advantageous to provide a properly protected dispensing area where such flammables are stored and from which dispensing is accomplished. This may be done through the use of safety cans or approved wheeled containers. It is important that control of dispensing operations shall be in the hands of a properly trained employee who recognizes the hazards involved, and who is held responsible for the proper enforcement of safety rules established for the area.

Safety cans designed for special problem in handling small quantities of flammables.

Other plants have found it advantageous to purchase certain of their flammable solvents in bulk quantities and have provided suitable storage involving buried or above-ground tanks. The provision of such properly arranged facilities constitutes a much safer installation than equal quantities of flammable liquids stored and handled in drums and smaller containers. Reduced acquisition and handling costs are at once apparent. While possibly not so evident, this method of storage, together with a properly arranged pumping and distribution system, reduces inherent fire and explosion hazards.

Pumping System

Transfer of these liquids from outside bulk storage facilities is usually accomplished by means of remotely controlled, electric motor driven pumps, with control switches located at the various dispensing or usage points throughout the plant. One system, which has proved to be satisfactory, operates through the use of loaded or gravity operated switches, in combination with weighted or spring loaded valves. This arrangement is commonly referred to as "dead-man" control. Insofar as it is practical, dispensing systems should incorporate features which would positively stop the flow of flammable liquids in event that there is failure of the "human element," electric power, instrument air, or any other actuating medium.

Such "fail safe" features are easily secured in a power operated liquid transfer system. Adequate control, however, is not so easily obtained in systems involving gravity flow. Primarily for that reason, transfer by gravity is not considered good practice from a fire safety standpoint. This weakness also is to be found in the transfer by means of compressed air. In addition, the explosion hazard may be increased

(Continued on page 66)

Above: Flammable liquid storage vault before it was modernized.
Below: Same vault, showing improvement in safety and cleanliness.

Conserve Manpower with Completely Mechanized Scrubbing

New SELF-POWERED SCRUBBER-VAC

Cleans Vast-Area Floors "By the Mile"

Freedom of range and *four-in-one performance* combine to give this *Gasoline-Powered Combination Scrubber-Vac* its exceptional cleaning capacity. Operating independent of power lines, the machine is free to go wherever the operator guides it . . . working in and out of production areas with ease . . . *scrubbing continuously . . . actually cleaning floors by the mile!* And this single unit — *Finnell's 218G* at left — applies the cleanser, scrubs, rinses if required, and damp-dries the floor — *all in one operation.* Thus it is capable of cleaning up to 16,000 sq. ft. per hour!

Self-starting engine eliminates rope-pulling as a means of starting. The *218G* starts quickly and easily by pressing the starter button. Operator will shut off rather than idle the machine, and thereby prevent carbonizing, a cause of engine trouble. All working parts of the *218G* are operated by *one* engine (2 cyl., 4 cycle, 9.4 hp., air-cooled). And there are no switches to set for *fast* or *slow* — slight pressure of the hand on clutch lever adjusts speed to desired rate (up to 136 ft. per minute). Two 18-inch brushes give a 36-inch scrubbing surface. The powerful vac performs quietly. Gasoline only is used for fuel (no mixing required).

Whatever the area of your floors, find out what *you* would save with a *Combination Scrubber-Vac. Finnell* makes a full range of sizes, including *electric* as well as *gasoline* models . . . available on lease or purchase plan. It's also good to know *there's a Finnell man nearby* to help train your maintenance operators in the proper use of *Finnell Equipment* and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 4101 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

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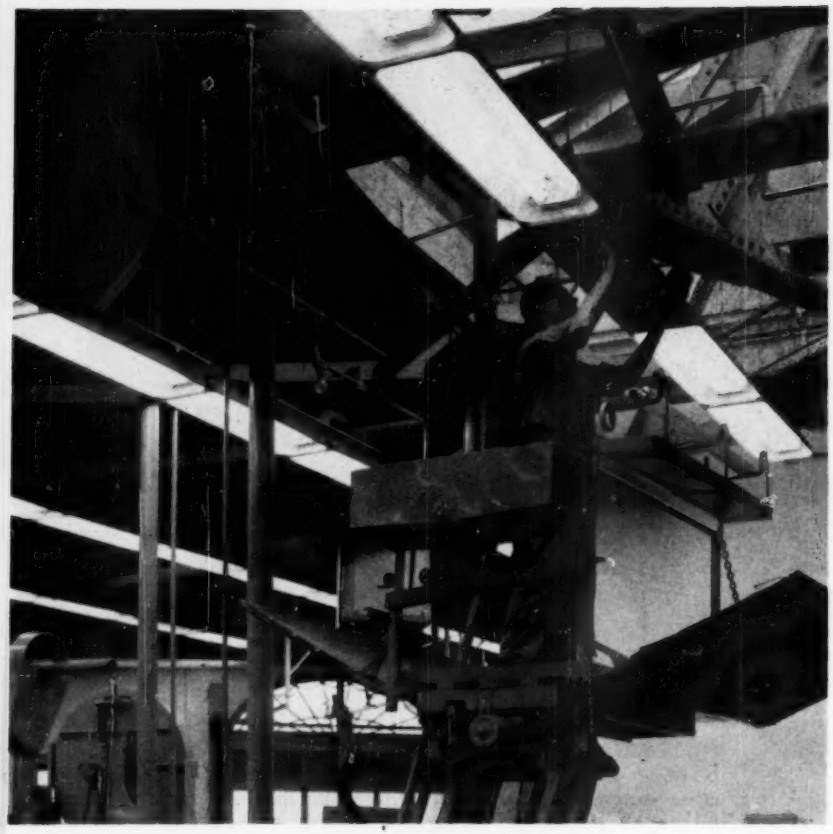


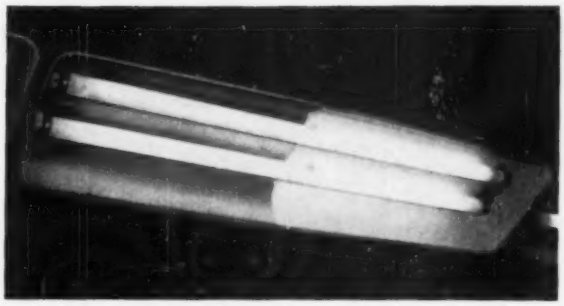
RIGHT—

Illustration shows several workers replacing lamps and cleaning fixtures from a relamping bridge. The bridge speeds up maintenance by qllowing several rows of fixtures to be handled at one time. In addition the bridge can be placed over doorways and aisles without obstructing traffic. Note containers for used and new lamps. Workmen have their equipment at hand and can do the job without many dangerous and unnecessary trips up and down ladders.

WHAT ARE THEY

LEFT & ABOVE—

It's a safer, faster and easier job to replace and clean lighting fixtures with mechanized industrial equipment. The lift raises the platform over machinery easily. A workman below can go about his job undisturbed by ladders and other usual equipment. Canvas flaps protect him and his machine from water and possible injury. Everything the maintenance man needs is up on the platform with him. Compartments contain detergents, sponges and other kinds of equipment; and water is pumped to the platform from the body of the machine. Lowering and raising of the platform is controlled by push-buttons on the platform itself. It permits servicing of lighting equipment up to 26 feet above the floor, and can be lowered sufficiently to roll through standard doorways.



It is impossible to tell, just by looking at a lighting fixture, how much it has depreciated. You can test this by holding a piece of paper over part of the fixture. There is depreciation, but is it a lot or a little? The lamp shown increased light output 75 percent when cleaned. One way to determine when maintenance is necessary is to use a light meter.

BETTER LIGHTING MAINTENANCE

SIX RULES for lighting maintenance:

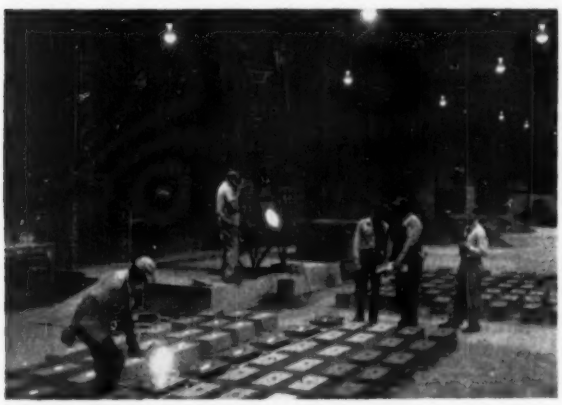
1. ESTABLISH PERIODIC CLEANING SCHEDULE.
2. USE LABOR-SAVING MAINTENANCE DEVICES.
3. MAKE PERIODIC LIGHT METER CHECK-UPS.
4. CLEAN OR REPAINT ROOM REGULARLY.
5. MAINTAIN PROPER VOLTAGE.
6. KEEP A STOCK OF PARTS.

UP TO?

For plants like this foundry, where it is difficult to keep light fixtures clean, lamps with built-in reflectors are useful. Dirt cannot reach the reflector and settles on the upper part of the lamp where it does not seriously affect the efficiency of the lighting system. The lamps are especially valuable for installation in difficult-to-reach positions, because of their long-life qualities.

Pictures by courtesy of General Electric Co.

Plant lit by lamps with built-in reflectors.



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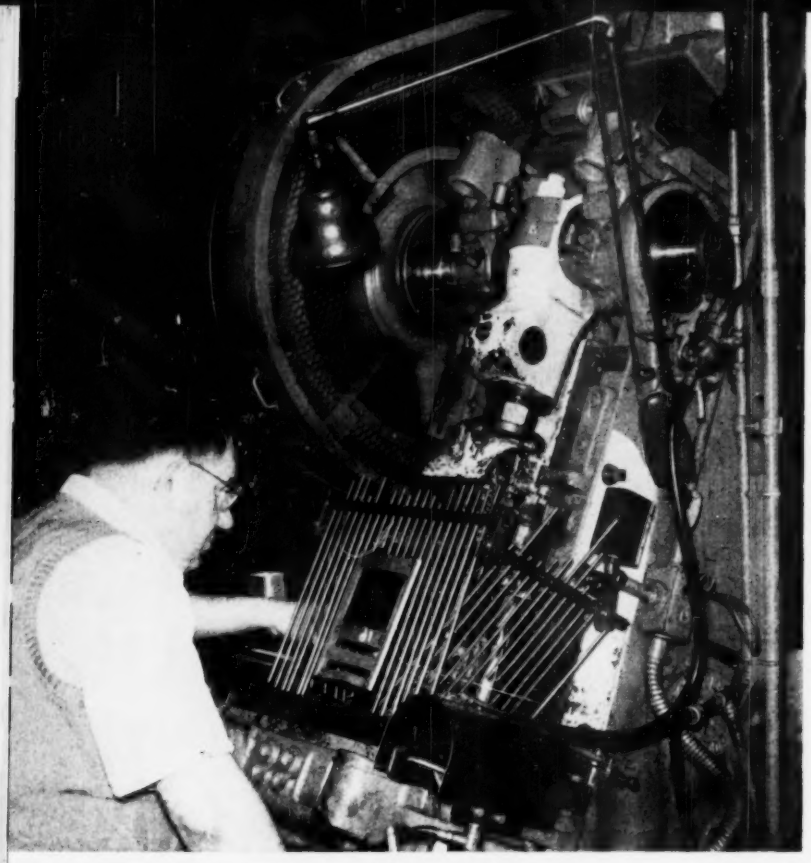


right permit feeding of stock and front window allows operator clear view of operation.

Fig. 2. Heavy plastic gate guard. Press will not operate unless gate is flush with die. Note operator wears safety hat and glasses.

Press guards are the basic tool of all efforts towards press-room safety. Besides point-of-operation guards—progressive dies, automatic and manual feeders and ejection devices are all vital to the operator's protection.

By J. C. BRENNER
Manufacturing Engineering Manager
Sperry Gyroscope Company
Great Neck, New York

TO RISK the safety of a worker whether by neglect or ignorance is to enslave him to inefficient operations, higher production costs and lower production. All of which is also bad business. In essence, a safe worker is a productive worker.

At our company, the approach to safety is considered an integrated effort of the machine tool builder, the methods engineer, the tool designer, the plant layout engineer, the shop supervisor, the safety engineer, and last but not least, the machine operator. Safety, to us, includes safe machines, safe tools and safe working conditions. An attempt is made to preplan safety in somewhat the same manner as the engineering of a new product would be preplanned. Cost is no deterrent in eliminating a potential hazard.

Safety consideration starts with machine procurement. At this time, a schedule is developed which integrates the activity of various phases of manufacturing engineering, such as processing, tool designing, tool building, plant layout and procurement. A copy of this schedule is forwarded to the safety engineer months in advance of actual delivery of the equipment.

Upon receipt of this schedule, (which incidentally is prepared on a semi-monthly basis in order to keep everyone informed of future acquisitions) the safety engineer reviews all purchases to pin-point equipment that will require adequate safeguarding. It is his responsibility to offer guidance in the design and development of the best safeguards. Also, the safety engineer is liaison man between the manufacturing engineer, who provides the processes and tools, the plant layout engineer, who provides the factory layout in which the tools will be used, the shop supervisor, who will be responsible for applying these methods and processes and the underwriters, who are concerned with accident prevention.

Press Safety Factors

No discussion of safety is adequate unless it considers machine design, die design, factory layout, maintenance and inspection, personal protection and training. The type and condition of press room equipment has an important bearing on the op-

OUT YOUR PRESS HAZARDS

FEATURE

This is the first of three feature articles concerned with Power Press Safety. The next two articles of the series will appear in the February and March issues of SAFETY MAINTENANCE & PRODUCTION.

Fig. 3. Sweep guard. Two vertical rods with rubber-tipped ends push operator's hands away from die as the ram descends on it.

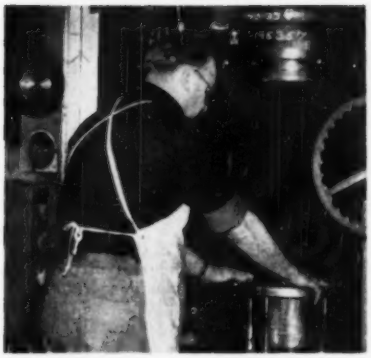


Fig. 4. Waist-high electric eye beam, when broken, causes ram to ascend and stop until operator leaves danger area.

Fig. 5. Materials-handling tong used to remove part. Point of operation is normally enclosed by a barrier guard.

For detailed descriptions of press guarding equipment, see pages 420–424 of the 1952–1953 edition of "Best's Safety & Maintenance Directory."

erator's mental attitude and performance, as well as on accident prevention. It is always possible to install safeguards on a press. However, guards are not always foolproof if an operator can remove them or render them ineffective.

An efficient guard is one that will protect the worker without impeding him and preventing him from turning out the normal production each day. The guard should be so attached to the machine that it cannot be removed by the operator and should be as simple as possible. Punch press guards should be so designed that there is no temptation for the operator to reject them as cumbersome. It is difficult enough to educate an employee to use caution and foresight in operating press room equipment; it should not be rendered impossible by making him work with impractical safeguards. Only through careful inquiry into the conditions under which an employee operates, can proper safety devices be determined that will permit him to work with the same efficiency and comfort as before.

It is essential that power press operators are not distracted from their work. From continuous working of the hand treadle, their motions soon become mechanical and automatic, which can prove disastrous if they are disturbed by sudden activity nearby. Most power press accidents result when the operator's attention is diverted for an instant, since he may forget to remove his hands from the point of operation as the ram descends. Constant repetition also reduces the operator's mental perception, so that he lacks the normal alertness necessary to prevent acci-

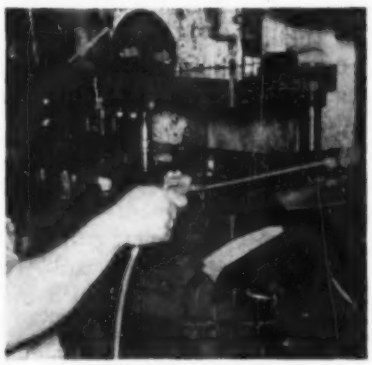


Fig. 6. Safety-feeder is suction cup and tube, operated from vacuum line. Operator does not have to put hands under ram.

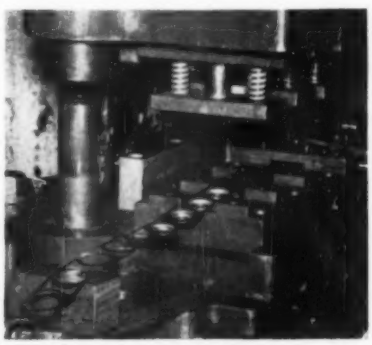


Fig. 7. Progressive die reduces hazards by combining several operations in one.

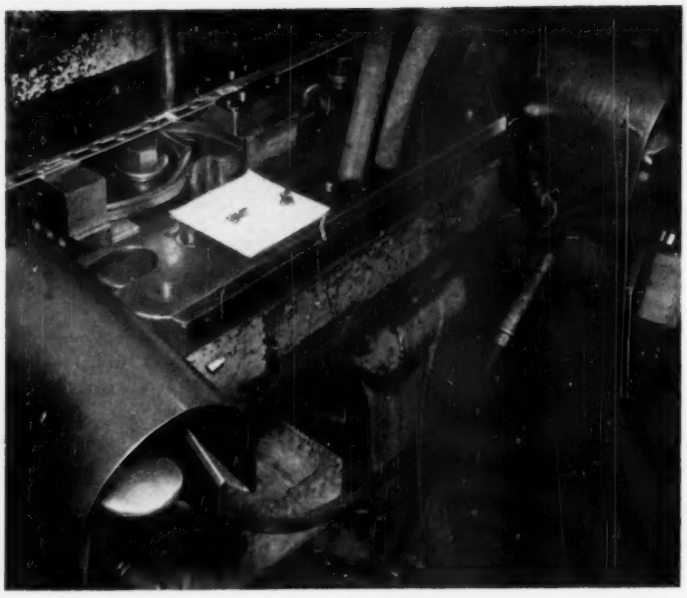


Fig. 8. Spring stripper on progressive die. The finished blank is stripped from punch and remains on top of the die. Part is ejected by air to rear of press. Note two hand valves force operator to remove hands from press danger zone.

dents on the job.

A guard, therefore, must offer positive assurance of eliminating accidents, despite hazards introduced by the operator or a mechanical defect in the machine. A popular misconception today is the belief that anything that covers a moving part of a machine is an effective safeguard. Although machine tool builders have progressed a great deal in the development of useful safeguarding—occasionally guards are found which are not guards, but rather misconceptions, which indicate the designer had appearance in mind rather than safety. Before a satisfactory safeguard can be determined, the points of danger in daily operation must be observed and analyzed.

Machine Design

Probably the best approach to machine safety is in the design of the machine itself. More thought is given today to the design of press room equipment for safe operation, and this is reflected by built-in guards in current models. As a rule, machine tool builders have incorporated in the design of machines protections for shafts and spindles, pulleys, belts, gears, clearances between fixed and moving parts and for projecting parts. An additional design feature which has greatly lowered the accident rate is the widespread application of individual motor drives. This has reduced the need for power transmission safeguards. However, when guards are not furnished by the machine manufacturer, it is necessary that they be provided by the producer.

These guards are of many types. They may be enclosures, covers or barricades. They are generally constructed of sheet metal, woven wire, plastic or wood. The majority of power press safety devices used in our company are so constructed that the press cannot be tripped while the operator's hands are in the danger zone. In order to be completely effective, the safeguards are designed to protect the operator whenever the ram descends, no matter why it does.

There are four basic types of safeguards generally applied to our presses:

1. Each press is equipped with two hand valves placed one on each side of the machine. Both valves must be pressed down by the hands of the operator simultaneously, before the clutch is engaged with the fly-wheel. This is considered by far the best safeguard. It is so constructed that it is impossible to actuate the clutch unless both valves are returned to neutral after each cycle. (Presses in Figs. 1, 3, 5, 6, 7 and 8 are equipped with two-hand controls.)

2. In most press operations the enclosure type guard is employed. In order to reduce the hazard of handling and ejecting material, a feeding and ejecting mechanism is generally built which, incidentally, results in an increase in production. Occasionally, enclosure guards are built into the dies, and at other times, they are built around the point of operation. (See Fig. 1)

3. Some guards are arranged to lock the clutch so that the hand valve will not operate the machine until the fingers are removed from the danger zone. In order to operate, the gate of the safeguard must be flush with the bed plate before the hand valve can set the machine in motion. Means are also provided with this type of guard to prevent the gate from rising until the press has returned to its original position. (See Fig. 2)

4. Another type of guard is one that pushes the hand of the operator away from the danger zone before the clutch engages the fly-wheel and causes the ram to descend. This is a radial type arm which swings beyond the center of the bolster as the ram is descending. (See Fig. 3)

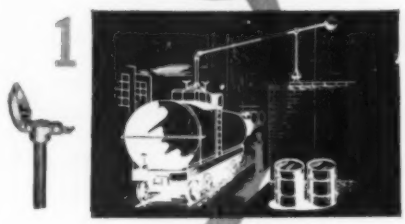
It is desirable that the safety device interfere as little as possible with production. Light beam protection is found more satisfactory than mechanical, since it does not obstruct the operator's view, and may be incorporated as a press control as well as a safety device. (See Fig. 4) A photoelectric eye may be used to prevent an hydraulic draw press from operating while the operator is in a dangerous position.

Our company has also improved production by using safety tongs (See Fig. 5) and (To page 38)

Use Protectoseal Safeguards ALL THROUGH the PLANT

FOR COMPLETE PROTECTION FROM FIRE AND EXPLOSION HAZARDS OF FLAMMABLE LIQUIDS

Your plant's fire and explosion protection is like a chain: it's only as good as the weakest link. That is why it is important to protect your entire plant, not just the department with the highest danger potential. No matter how you use, dispense or store flammable liquids, there is Protectoseal equipment to help you do it safely.



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2 DANGER IN STORAGE YARD Volatility of flammables—atmospheric changes—changing tank pressures—and surrounding fire demand specific time-tested vents and fittings.

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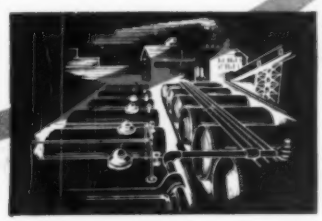

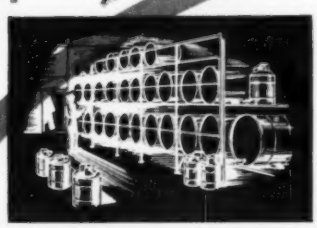

3 DANGER IN STORE ROOM To safeguard the many hazards inherent in storing flammables, *Protectoseal* builds a complete line of fire-safe storage and dispensing equipment. If you have a special problem involving the safe handling of hazardous liquids, *Protectoseal* is ready to produce according to your requirements, should standard equipment not exactly meet your needs.

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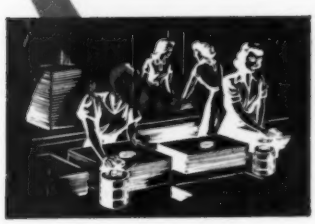

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RUBBER

By S. A. HALL
Beacon Falls Rubber Footwear
Beacon Falls, Connecticut

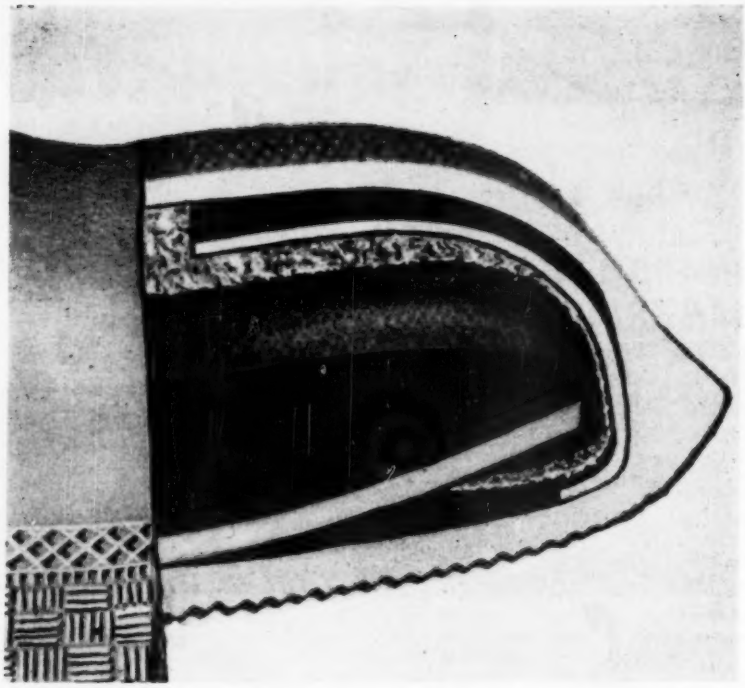

Fig. 1 Cross-section of rubber safety shoe illustrates built-in steel toe cap. Cap is designed to withstand a ton of pressure, or 50 pounds dropped one foot.

Fig. 2 Colored outer toe cap denotes rubber boot has steel toe cap safety feature.

Fig. 3 Note non-skid design outsole to protect against dangerous falls on wet surfaces.

ONE very important part of any industrial safety program is foot protection. Safety toe leather shoes, in both work and dress styles, are now standard equipment on many jobs. Where leg covering is required in addition to foot protection, rubber boots and pacs in different heights are used extensively. There are various styles on the market—many of which are designed for a particular purpose or type of work.

Prior to the early thirties, ordinary rubber boots and pac items were used where completely waterproofed footwear was required. For many types of work, however, additional safety features were needed and several manufacturers started de-

Fig. 4. Illustration shows longer-wearing rubber outsole, designed for workers who must walk on very rough surfaces or sharp objects.

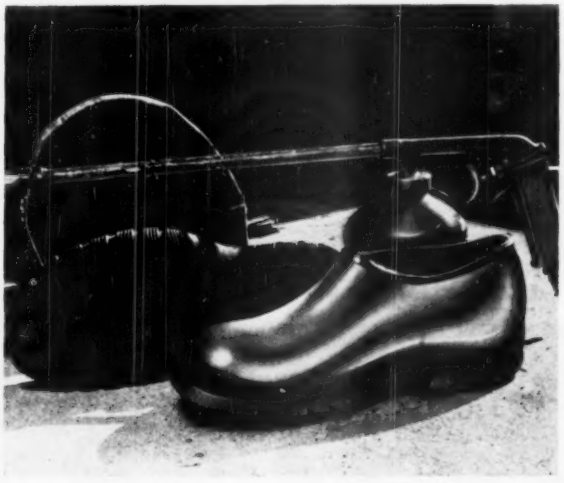

Fig. 5. Neoprene rubber footwear, shown here, has high resistance to oils, acids, and chemicals which deteriorate natural rubber.

FEATURE

This is the second of a series of three feature articles on Foot Protection. The final article of this series will be published in the February issue of SAFETY MAINTENANCE & PRODUCTION.

FOOTWEAR FEATURES SAFETY

Rubber boots and shoes have many built-in safety features and are available in many models suitable for various maintenance and production jobs.

veloping new designs and constructions. One of the first important features to be incorporated in boots and pacs was a hard toe cap to provide extra protection against toe and foot injuries. These toe caps were first made of hard rubber, but in the early thirties as safety standards became more rigid, they were changed to steel.

Steel toe caps are tested to withstand a steady pressure of 2000 pounds and the impact of a 50-pound weight dropped from a height of one foot (See Fig. 1). They are built into the footwear so that there is no bulkiness or discomfort. The wearer does not even feel them. As a means of identification safety-toe rubber footwear usually has an outer rubber toe cap of a different color than the boot. Rubber footwear with steel safety toes, is now obtainable in a variety of styles and heights to take care of almost every requirement. Industrial boots, with or without a steel toe, are in great demand today where this type of protection is important. They are available in all heights (See Fig. 2).

Fig. 6 Flexible and durable lightweight boot can be worn over steel toe shoes.

Several other important features have been added. Many boots, pacs, arctics, and work rubbers have outsoles and heels made of a slip-resistant material or in non-skid design to prevent slips and falls on wet or slippery surfaces (See Fig. 3).

Tougher Outsoles

Molded rubber outsoles, made by curing the rubber under high pressures, have grown in popularity, because of their good resistance to scuffing and abrasion. Workers who must walk on extremely rough surfaces or sharp objects which cut and chip ordinary rubber outsoles find that these longer wearing outsoles give considerably better service (See Fig. 4).

Another safety feature is the use of a special steel insole in boots or pacs to prevent nails or other sharp objects from coming through the sole and injuring the foot. Some of these insoles are fabric covered while others have a leather insole attached to the steel insole. Although they are not generally supplied by rubber footwear manufacturers, these insoles can be purchased elsewhere in various sizes to fit the shoe.

One very important development in rubber footwear in recent years has been the use of synthetic rubber. Substituting synthetic for natural rubber was necessary during the war years because of our government's natural rubber conservation program. It was found that the properties of certain synthetics used in the rubber compounds gave added wearing qualities and resistance to various oils, acids, and chemicals which deteriorate natural rubber. Neoprene rubber compounds are particularly good in this respect. Boots, pacs, and rubbers of neoprene are being more widely used in the oil and dairy industries, meat packing houses, chemical plants and

For detailed descriptions of footwear & protective equipment see pages 222–242 of "Best's Safety and Maintenance Directory" 1952–53 edition.

other industries where footwear made of regular compounds does not give normal wear under the particular working conditions (See Fig. 5).

The present trend is to manufacture lightweight rubber footwear that is more flexible and durable. One example of this trend is the pullover or leggin boot which is worn over the shoe (See Fig. 6). Available in both hip and knee lengths, it has a light and flexible upper construction that allows the wearer freedom of motion and full protection. Regular steel toe leather work or dress shoes can be worn inside this boot.

Leather-Appearing Rubber

An all-rubber workshoe, designed to give the appearance of a leather shoe is a popular item among industrial workers, for it is lightweight and waterproof, thereby eliminating the need for an over-boot (See Fig. 7). This shoe is available with or without a steel toe.

Many standard rubber footwear items have been streamlined in patterning and made lighter in weight without sacrificing any of the wearing qualities. Where possible, protruding flaps or joints in the uppers have been eliminated to prevent snagging or tearing and, in this way, lengthen the life of the shoe. An example is the boot pac, a pull-on style with steel toe features, designed specifically for miners (See Fig. 8).

Comfort features are incorporated into most brands of rubber footwear. Scientifically designed lasts and sponge cushion insoles are important additions helping to prevent foot fatigue. Patented arch supports built into the shoe are also available. They too help to reduce foot fatigue, especially where workers are required to stand for long periods of time.

Proper fit is as important when buying rubber boots, as it is when buying ordinary footwear. The weight of the body should be on the feet when measurements are taken. Fitting rubber shoes too long is equally as bad as fitting them too short, for the feet will be chafed and often full protection from the toe cap will not be obtained. Fatigue is often the cause of many accidents. Foot comfort is an important factor in preventing fatigue.

Care of Rubber Footwear

Proper care of rubber footwear lengthens its life. All rubber footwear should be wiped off or cleaned often, particularly when used in contact with substances injurious to rubber. Warm water or a mild soap solution will usually do the job. Gasoline or other solvents should never be used, for they are harmful to rubber.

Grooves in non-skid soles and heels should be cleaned out, when they become clogged with dirt or other materials, in order to prevent unnecessary wear and to assure proper functioning of the non-slip feature. When shoes are worn by more than one operator, they should be sterilized after each use. Many plants have set up a procedure for this.

The best place to store rubber footwear when not in use is in a dark, dry and cool location, free from air circulation. Ozone, present in the air in varying amounts depending on the section of the country, has an injurious effect on rubber. Rubber footwear, stored in areas where there is a free circulation of air, will check or crack because of the ozone. Hanging rubber footwear upside down from the heels prevents stress or strain at any given point and eliminates excessive cracking from sharp creases or folds. It also allows the inside of the shoes to become completely dry, and prevents the fabric linings from rotting because of excessive moisture.

Fig. 8 Miner boot pac illustrates safety streamlining through elimination of protruding flaps or joints likely to snag and tear.

Each year more and more safety footwear is being used for all types of industrial purposes. Many who have not previously used rubber footwear are discovering a need for one type or another in daily operations. With the expansion of safety programs throughout the country there is little doubt that the rubber safety footwear field will continue to develop and expand.

Pictures by courtesy of Beacon Falls Rubber Footwear.

Fig. 7 All rubber workshoe, light and waterproof, gives appearance of leather and eliminates need for over-boot over workshoe.

Stamp Out Press Hazards

(cont'd from page 34) safety feeders. The safety feeder instantly holds the material with a firm grip and eliminates time lost by the operator in trying to pick up slippery pieces. It lengthens the operator's reach and enables him to use a wider bench space without stretching or leaving his seat. The safety feeder also boosts the operator's morale. He works faster when he knows that he

(Continued on page 40)

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is not endangering himself. (See Fig. 6)

Die Design

Next to machine design, in order of importance, is the design of dies. The majority of punch press accidents can be prevented by proper die design that eliminates any need of placing hands in the point of operation. Some of the more important features included in designs are spring strippers, barrier guards, nests and guides for materials, semi-automatic feeds and positive strippers.

When quantity permits, it is practical to eliminate secondary operations by designing progressive dies that will combine two, three or more operations into one die. These dies eliminate the hazard of material handling during a successive sequence of operations, bringing increased production and safety at reduced cost. (See Fig. 7)

Spring strippers are used on compound dies. This type of stripper allows the punched part to remain on top of the die until subsequently ejected to the rear of the press by air ejection, mechanical knock-off or manual removal. (See Fig. 8) Considerable improvement in the methods of ejecting finished parts from compound dies materially helps to reduce accidents and also increases production.

Blanking dies and many second operation dies are guarded by a barrier or enclosure guard. When properly constructed and secured to each die set, the barrier guard will give maximum safety to the operator. (See Fig. 9) The type of barrier guard used varies with the type of operation. The most important factor is that the guard allow easy feeding of stock. The barrier should not limit the visibility of the operator, but should, at all times, keep the operator's hand out of the danger zone when the ram descends. Dies are designed with either fixed or permanent nests or stock guides.

Makeshift setups in the press room can not be tolerated since they increase the hazard of operation, reduce production and work accuracy and make safety applications difficult. Semi-automatic feeds, which include slide feeds, push feeds, follow feeds and magazine feeds, are ideal for secondary operations. This type of feed has a low cost and will increase production.

Positive strippers are used wherever practical. These strippers permit the blanks to pass through the die and feed into a container. This elimination of hand ejection of parts makes the operation much safer. In addition, it is simple to adapt the barrier or enclosure type guard on this die and stripper, thereby obtaining maximum protection. Generally, in bending, forming and assembling dies, if the work clings to the punch, it is best to arrange a side cam, latches or hooks that will eject the piece when the ram ascends. This relieves the operator of the task of removing the piece manually—always a dangerous procedure.

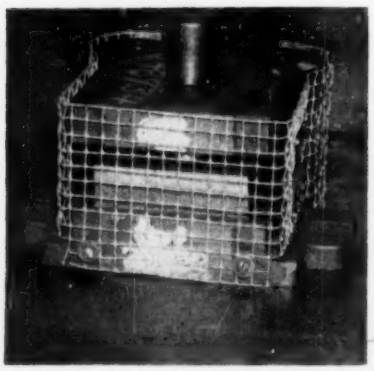

Fig. 9. Barrier guard incorporated in a blanking die. Side openings are required to feed stock. Finished blanks drop to rear of press.

Good Housekeeping

Another important consideration in press room safety is department layout and housekeeping. Dirty and obstructed work places are conducive to accidents. Factory layouts should take into account: location of the machine, storage space for raw material and finished parts, adequate aisle space, position of the operator clear of aisle traffic, proper material handling devices and good lighting. Provision should be made for handling scrap by locating drums at convenient points away from the

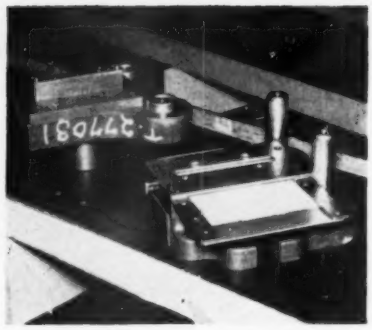

Fig. 10. Positive stripper on blanking die with nest and stock guides. When ram ascends cover plates prevent stock from lifting.

center of operations. Idle bolster plates and dies should be stored on pallet racks. Cleanliness is essential on the surrounding floor area to keep it free of grease and oil. It is the responsibility of each foreman to see that the cleaning of floors and passages and the removal of waste is regularly accomplished. Almost all mechanical operations can be conducted under more pleasant and safer conditions. Ample space should be provided around each machine for the work and the movement of the operator. Try not to economize on floor space to the extent of introducing a hazard.

Good lighting is just as essential in preventing accidents as it is in getting high operating efficiency. When natural light is properly applied, it is the ideal form of illumination. Local lighting provides individual lights for each machine. General lighting provides a satisfactory level of illumination over the entire area. A combination of the three is the most satisfactory. Presses can be equipped with incandescent spot lights, adjusted to direct the light at the top of the die and afford the operator best visibility. (See Figs. 1 and 6)

Operators also should be provided with the correct type and height of chairs to permit ease of operation and freedom from congestion. This reduces potential hazards caused by loss of balance when the operator becomes tired.

The press room layout must be accepted by the manufacturing engineer, shop supervisor and safety en-

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gineer before it is installed. A layout is not acceptable unless the equipment is in safe working order and proper guards are supplied. Like all mechanical devices, the machine, die or safeguard will subsequently break down and become dangerous. Mechanical failures in the punch press can be avoided by having competent maintenance men responsible for servicing the equipment regularly. In this way, accidents are reduced and production deterrents minimized. Maintenance personnel may inspect the punch press equipment on a daily basis. The maintenance man is one who is familiar with press type equipment and qualified to make necessary repairs. The machine repair group should maintain a log showing the inspection and maintenance performed on each machine. This log is the basis for recommending replacements of press equipment when the machine maintenance becomes abnormal. Maintenance of press room equipment also includes checking the operation of safeguards and replacing broken or missing parts. When a machine is down for repairs a tag should be prominently displayed to indicate this fact.

Operator Clothing

It is just as important to provide the operator with protective devices as it is to put them on the machine. Long hair is dangerous around machinery and for this reason, women workers should wear hats. Although women prefer hair nets or turbans, these are not as safe as a high crown and visor cap. Safety glasess are mandatory for the operator, as protection against flying chips. Hand protection consists of gloves, hand pads, mittens or finger cots. These aids deter minor scratches, slivers and skin irritations, which may lead to operator discomfort, reduced performance and lost time. Safety shoes should be worn where heavy work or material is handled. Work clothes ordinarily are safe for most operations, if they fit properly. Loose clothing is dangerous since it may be caught in machinery.

All pre-planning measures are of little consequence unless properly conveyed to the operator. Training and supervision is the shop foreman's duty. The provision of safeguards on press room equipment does not relieve the foreman of responsibility for safe production. He must stop an operation if the proper guard is not supplied, or found inadequate. Even with protective devices, there exists the right and wrong way of performing an operation. It is the foreman's duty to instruct the operator in the safe operation of equipment.

Cooperation Needed

It is just as important to train the foreman, set-up man, die designer and plant layout engineer. This is the function of the Safety Engineer. He keeps abreast of current safety procedures and conveys this information to proper channels. In addition, a campaign of education throughout the shop should always be in operation. The safety committee constantly tours the shop, looking for hazardous conditions, reporting them to responsible departments and following up on remedial measures.

Safety is not the individual responsibility of one man. It can be accomplished only as a joint effort between the safety engineer, machine tool builder, tool designer, operator, supervisor and plant layout engineer, and must have the very active support of top management.

Pictures by courtesy of Sperry Gyroscope.

Armand Addresses New Haven Safety Council

AT THE monthly meeting of the New Haven Safety Council held in that city late in November, Harry Armand, Editor of SAFETY MAINTENANCE & PRODUCTION, spoke to the members of that organization on "Finding New Package for Accident Prevention."

Safety Shoes Can Lower Foot Accidents 85% In Construction Industry

ADOPTION of safety toe shoes as standard protective equipment in the construction industry would reduce foot and toe accidents by 85%, according to a report submitted to the safety committee of the National Constructors Association, an organization composed of builders of chemical plants, steel mills and petroleum refineries. The report was prepared by H. B. Wallace, engineering and construction division, Koppers Company, Inc. The report indicated that safety toe shoes are not generally used in the construction industry, in which the majority of foot accidents are caused by falling material and nail punctures.

One of the basic difficulties in establishing a satisfactory safety shoe program in the industry is the type of operation characteristic of a construction company. Such an organization may have 20 to 30 jobs, employing from a score to several thousand men each scattered across the United States and Canada. It would not be feasible to have a shoe room or shoe-fitting personnel on each job.

To meet the difficulty, the report recommended the use of mobile shoe units that would periodically visit all field jobs. The mobile units are staffed with competent shoe salesmen, who handle fittings and keep records of each man's size for future use. Previous to the visit, a film on the need for safety shoes would be shown to construction workers.

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TRANSPORTATION

Vehicle Fire Standards

THE National Board of Fire Underwriters has made available copies of its latest standards for fire protection and prevention in transit operations. The standards, recommended by the National Fire Protection Association, are intended to provide reasonable safeguards against fire hazards.

Observance of the standards is suggested because of the high unit value of transit vehicles, as well as the necessity of preventing disruption of essential transportation services.

Copies of the 30-page booklet may be obtained free of charge from the National Board of Fire Underwriters, 85 John Street, New York 38, New York.

Will Super-Highways Bring Super-Accidents Or Super-Safety?

REGULATION of automobile drivers must become more rather than less restrictive to assure safe highways and safe transportation, the Indiana Association of Insurance Agents has been told by Paul H. Blaisdell, public safety director of the Association of Casualty and Surety Companies.

Declaring that there is little to choose between no traffic law enforcement at all or enforcement that is weak, Mr. Blaisdell asserted that "the technique of selective enforcement used by progressive police departments must be applied in larger doses as our network of super-highways becomes a reality." Citing one instance of a driver who traveled the entire length of the Pennsylvania Turnpike without seeing a patrol car, and another of a woman motorist who was stopped three times for exceeding its 70-miles-per-hour speed limit but was allowed to continue "blissfully on her way," he declared that "we are not even keeping pace with 1952 conditions" in meeting the problem of highway safety presented by unenforced speed limits.

"Under the present standards of traffic law enforcement, and under present trends of tolerating higher and higher speeds on our most up-to-date roads," Mr. Blaisdell said, "we have worked ourselves into a dilemma of expecting the individual to be infallible in judging his own safety saturation point."

Pointing out that by the end of 1953 the series of new "turnpikes" will extend from Maine through Ohio, permitting a motorist to drive continuously without ever leaving a limited-access thruway until reaching the Indiana state line, Mr. Blaisdell continued, "You will have created a super-highway. The automobile engineers will have provided super-vehicles, using super-fuels, to traverse that highway. Simultaneously will be born the opportunity for super-accidents unless traffic is strictly controlled. Unfortunately, mere man is unable to fashion the super-brain required to travel all these hundreds of miles at super-speeds, requiring super-alertness and super-judgment."

"Homo-Turnpikensis"

Mr. Blaisdell jestingly intimated that a new anthropological creature, "homo-turnpikensis," might finally be evolved on the super-highways, but warned that "the carnage will be frightful." He described the new creature as follows: "His right foot is three times larger than his left from the constant pressure on the accelerator. His eyes have become two narrow, vertical slits because he now needs to look only straight ahead in the stream of traffic. His left hand has become webbed and atrophied from the constantly unmoved position of holding up the top of his car.

"My plea for straightforward thinking on the accident problem is not a plea to abandon our modern highway construction program or to revert to less powerful motor vehicles. We cannot apologize for progress or stop its relentless course. I am only pointing out that the enforcement volume of five years ago, or even of 1952, is ineffectual against the new era of highway transport."

Urging greater public support of plans to achieve safer highways, Mr. Blaisdell felt a new note of realism has appeared in evaluations of what has been accomplished toward traffic accident prevention—"a common sense approach which admits that the conflicting appraisals of the safety professionals have created nothing more than confusions in the minds of people whose support they have requested." This viewpoint says, he declared: "Give me the facts of where we stand and what we need to do to reach our safety goal and I will have something on which to base purposeful activity.

"We may as well admit that the people cannot shoulder the entire blame for the fact that the traffic safety machinery of today is stuck on dead center," Mr. Blaisdell added. "We may as well face up to the basic premise that unless public officials can agree, in a state or community, as to just what they need for safer highways, the public has nothing to support. No amount of apology can excuse our state and local officials from their primary responsibility."

But public support is not without fault, he added. In the absence of official leadership it has been all too willing to wave a languorous hand at the challenge rather than to take the initiative in starting traffic accident

prevention activities of its own.

The "new traffic safety philosophy" has shown itself in the decisions of the 1952 President's Highway Safety Conference "to get out of the ether of beautiful plans and down to the bedrock of purposeful plans," according to Mr. Blaisdell. It finds outlet, he added, "every time we recognize the certainty that traffic control methods designed for 1930, 1940 or even 1950 will not suffice in this day of 54 million vehicles and 64 million licensed drivers."

Transit Fire Protection

THE National Fire Protection Association has just brought out its new standards for fire protection and prevention in transit operations. The standards are of current interest to the manufacturers, operators and riders of streetcars, motor coaches and trolley buses. As traffic increases, accidents become more numerous, with greater chance of fire and yet greater demand for fire safety.

Existing NFPA standards on electric cars and trolley buses, including houses and yards, are brought up to date in the standards pamphlet and co-ordinated with other NFPA standards. Fire-safety recommendations for types of transit vehicles previously untreated in such standards, as those powered by internal combustion engines using gasoline, diesel oil or liquefied petroleum gas, are also developed.

Transit Fire Dangers

The new standard attacks the whole front, from car to car barn. No longer a barn, the modern transit garage is a building constructed and maintained specifically to house the high-valued vehicles. Construction should be fire-resistive, without basement. However, the heating plant may be located in a basement if entrance is from the outside only. Exits, fire walls, floors and pits are treated in the pamphlet, with emphasis on subdivision.

Floor areas used for storage of transit vehicles without suitable subdivision by fire walls must not exceed the following specifications, unless otherwise approved by the authority having jurisdiction:

TYPE OF BUILDING	AREA LIMIT SPRINKLERED	UNSPRINKLERED
Fire-resistive construction	60,000 sq. ft.	25,000 sq. ft.
Noncombustible "	45,000 " "	15,000 " "
Unprotected metal "	45,000 " "	15,000 " "
Heavy-timber "	30,000 " "	15,000 " "
Ordinary "	30,000 " "	10,000 " "

These area limitations take into consideration the number of vehicles subject to destruction in a single fire area and the effect of loss of such vehicles on transportation service. For areas or buildings used for purposes other than storage of vehicles, area restrictions must be as specified in the National Building Code, unless otherwise approved by the authority having jurisdiction.

Floors must be pitched to a drain discharging through an oil-separator to a sewer or outside vented sump. Sawdust is forbidden for use on the floors. Work pits must have exits with non-combustible steps suitable for instant departure.

In the requirements for lighting and wiring, National Electrical Code requirements are applied to many aspects of building and yard wiring, with special rules for trolley coach driving systems and electric systems within the vehicles.

Motor Coach Storage

Areas used for the storage of motor coaches should be separated from storage areas used for electrically propelled cars or trolley buses. Repair and servicing areas, as well as the offices, sanitary facilities, recreation and smoking rooms should also be separated from vehicle storage areas. Provisions are included for automatic sprinkler protection, standpipes and hose stations, as well as portable fire extinguishing equipment with suggestions for establishing watchman services and organizing fire brigades. For buildings of high value, central-station alarm services are recommended for sprinkler systems, and a municipal fire alarm box should also be readily available. Vehicle yards must have plentiful water supplies, with hydrants; monitor nozzles on 20-foot towers are recommended where needed; strict rules are proposed for track spacing, storage, fueling installations, cutout switches and trolley wire supports, to restrict the extent of damage in congested yards.

For cars and buses, interior trim must be of materials that will provide "reasonable protection against the starting and spreading of fires," and all-metal construction is recommended for body and roof. An emergency exit must be provided in the rear or on the opposite side from the normal doors. Fuel tanks must be so located on the bus and be so protected as to minimize to the lowest degree the danger of rupture due to a collision and prevent the entrance of flammable vapors into the passenger compartment. Fueling arrangements, carburetor shielding and

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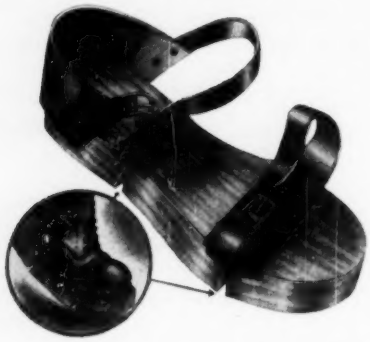

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safety measures for the exhaust system are specified in detail, for passenger protection.

The standards pamphlet may be purchased for 50 cents from the National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

Purdue Offers Course In Vehicle Maintenance

THE third Motor Vehicle Maintenance short course to be held at Purdue University, February 23 through 27 will be keyed to meet the needs of mechanics and supervisors employed by truck and bus fleet operators, according to O. C. Cromer, professor of automotive engineering at Purdue.

The short course will cover service tools and equipment, electric systems, batteries, lubricants, brakes, bearing installations, fuels, fire prevention, job planning and industrial relations. Emphasis will be placed upon human relations and the training of mechanics to meet maintenance problems.

Complete programs may be obtained by writing to the Division of Adult Education, Purdue University.

Driver Education

SEVERAL speakers at the 40th National Safety Congress discussed various phases of the problem of driver education.

Drivers faced with a traffic emergency probably are headed for trouble if they do what comes naturally, according to Dr. Herbert J. Stack, director of the center for safety education, New York University. Speaking to an audience of school teachers and administrators at the Congress, Dr. Stack stated that driver aptitude tests developed at N.Y.U. show that the natural response to traffic emergencies is often the wrong response.

"Take the example of a car rounding a slippery curve at high speed," he said. "The vehicle goes into a skid with the rear wheels sliding to the right side of the road, possibly off the pavement. The natural—but wrong—tendency on the part of the driver is to steer away from the direction of the skid, to jam on the brakes and, if he loses his head completely, to step on the clutch."

To meet emergencies with the right response, Dr. Stack suggests that all drivers be given a series of practice lessons on emergency situations. The N.Y.U. study lists 20 such tight spots that even the best drivers are likely to get into. A set of correct responses has been drawn up for each of these emergencies. Other studies conducted by the cen-

ter for safety education on the personal characteristics of traffic accident repeaters show that the basic causes of accidents are to be found in faulty attitudes, personality maladjustment and lack of knowledge about safe driving practices.

Driver education, the something new that has been added to both youth and adult education, is continuing its phenomenal national growth, according to Norman Key, secretary of the National Commission on Safety Education, National Education Association, speaking to the School and College Section of the Congress.

The full extent of the growth of driver education will be revealed when a national survey now underway is completed. Mr. Key cited a yet unpublished study of the 5 year span from 1946 to 1951 in which safety and driver education had a curriculum increase of more than 600 percent. The same study indicates that driver enrollment in classes has increased 535 percent since 1946.

Just as many Americans return to college for specialized training, so should the average adult automotive driver get added "schooling," the School and College Section was told by Robert K. Mattern, of Senior High School, Reading, Pa. He outlined the new trend—a logical extension of the successful teenage driver training in U. S. high schools.

"Studies disclose that too many adults are incredibly uninformed regarding good driving practices, and show serious weaknesses in proper attitudes so vital to safety on our streets and highways," Mr. Mattern stated. "Adult drivers need driver education. In the past, such courses have been conducted primarily to meet state license requirements. Now newer developments in the adult program stress the finer techniques of driving and better understanding of rules of the road."

Such refresher and advanced adult training courses are proving successful in many states, he continued. At little extra cost, by using existing school facilities, beneficial adult pro-

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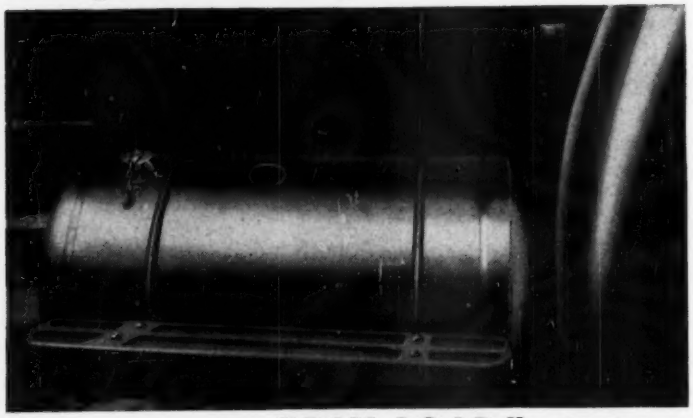

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grams can be developed, he said.

Safety taught for only one semester is like an empty box—there's really nothing in it was the theme of Gilbert S. Willey, school superintendent, Winnetka, Ill., before the School and College Section.

"Safety must be lived and experienced in all school and out-of-school life," he said. "Versatile and competent teachers will find occasions for positive safety instruction in practically every class period of the day."

He suggested teachers should have a guidebook to show them how to develop a continuing safety consciousness in students. He listed 9 school responsibilities for providing a safe environment: (1) new school sites located away from main thoroughfares; (2) one-story buildings having many inherent safety features; (3) safe playground equipment; (4) patrols at nearby corners and crossings; (5) traffic safety signs placed in conspicuous places; (6) the removal of fire hazards; (7) safe bus transportation; (8) properly surfaced playgrounds, and (9) floors with non-skid finish.

"Thou shalt not kill" is a moral precept that applies to accidental as well as purposeful death, the Congress was told by Leland D. Hobson, professor of industrial engineering at Kansas State College, Manhattan. He said: " 'Thou shalt not kill' is just as much a law for car drivers, for plant managers, for building designers, as it is for bandits. It seems to me that it is time that we make clear to people that safety is a moral issue and that it is just as immoral for a person to resort to unsafe practices as it is for a person to rob or murder."

Prof. Hobson told his audience, composed mostly of public employees, that any man who steps into the driver's seat of a car, accepts the management of a plant, or undertakes the design of a highway system or a home has accepted a responsibility for carrying on his task without endangering the lives and the happiness of other people. It is not only immoral to commit unsafe acts, it is immoral to neglect doing everything possible to prevent others from committing murder by accident, he said.

Drivers must be trained to fight the tendency to go asleep when the going gets dull, according to Dr. A. R. Lauer, director of the driving research laboratory, Iowa State College, Ames. Dr. Lauer told the School and College Section that recent studies at Iowa State have shown that roadside stimulation is important in maintaining driver efficiency.

"Conditions of driving are not stimulating enough to keep the driver alert," he said. "This is borne out in many practical situations such as the higher incidence of accidents at night than in daylight, higher and increasing fatal rates in rural driving over urban driving and higher accident rates for the open spaces of the Midwest and Western states than for the congested and cluttered roads of the Eastern states. Drivers must be trained to combat this tend-

ency to let down under monotonous conditions of driving."

Other conclusions he said that have been reached in studies at his university are:

1. The use of lights or reflectorized materials by vehicles at night greatly reduces the time needed for spotting vehicles and recognizing speed differential. This range varies from about 6 seconds for a dark vehicle to slightly over 2 seconds for a highly lighted and reflectorized vehicle.

2. Any type of filter which reduces light transmission, such as the "so-called" night-driving glasses or tinted windshields, is detrimental to sharpness of vision and consequently to distance perception.

3. While women drive only one-tenth of the total mileage they have less than one-tenth of the accidents. Women violate traffic regulations less frequently than men. Women are more conservative in their driving habits, particularly in allowing sufficient following distance at night.

4. Contrary to popular opinion, older cars are not involved in more accidents than new cars when number of vehicles on the road are compared. Condition of the vehicle is more important than age.

"The nation's youth need and want a well-balanced, behind-the-wheel driver education course as a required, credit course in the curriculum of every high school in the country," Don Devereux, a Northwestern university student, told the School and College Section. He said that teachers were best qualified to teach young persons to drive because youth holds them in high respect.

Mr. Devereux criticized parents for passing on their own bad driving habits, asserting that too many parents lack both understanding of how to teach driving and the patience necessary for competent instruction. He added that the accident toll of parent-taught drivers has been increasing, while that of graduates of high school courses has been reduced by more than 50 percent. He urged parents to help attain safer driving by promoting high school driver education.

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THE FIRE FRONT

Forecast For 1953: Smoky And Warmer

THE fire forecast for 1953 is "*more* and warmer," according to Percy Bugbee, general manager of the National Fire Protection Association.

Addressing the NFPA regional conference in Houston, Tex., he predicted that on any average day in 1953: a fire will occur in the United States every 2 seconds, 34 people will burn to death and more than 100 more will be injured and disfigured by fire, 1,000 homes will suffer fire damage, and more than 2 million dollars worth of property will be destroyed. On this average day in 1953 some 275 fires will be started by careless smokers and more than 50 fires will be started by children playing with matches. Mr. Bugbee also predicted that during the year the federal government will lose many millions of dollars worth of essential defense supplies in government warehouses through disastrous fires, and that a number of nursing homes will be destroyed by fire with consequent loss of life. He expressed the opinion that fire might be expected to cause a large loss of life at Christmas time 1953 in either a department store or a church.

Mr. Bugbee then pointed to some measures that might be taken to prove his predictions false. A great majority of fires are caused by simple acts of human carelessness, he said. These acts of carelessness can not be excused on the grounds of ignorance because of effective fire education in public schools and through home fire prevention campaigns, he added. Mr. Bugbee asked women's organizations throughout the country to actively support the fire prevention education program and suggested that all fire departments should inspect all homes in their communities annually to discover and prevent common fire hazards.

Eventually, Mr. Bugbee predicted, the time will come when fire is considered not a misfortune but a misdemeanor; and the careless person who permits fire hazards to exist in his own property and thereby endangers the lives and property of his neighbors will be called to account instead of being given sympathy.

Fire Losses Up Over Last Year and Last Month

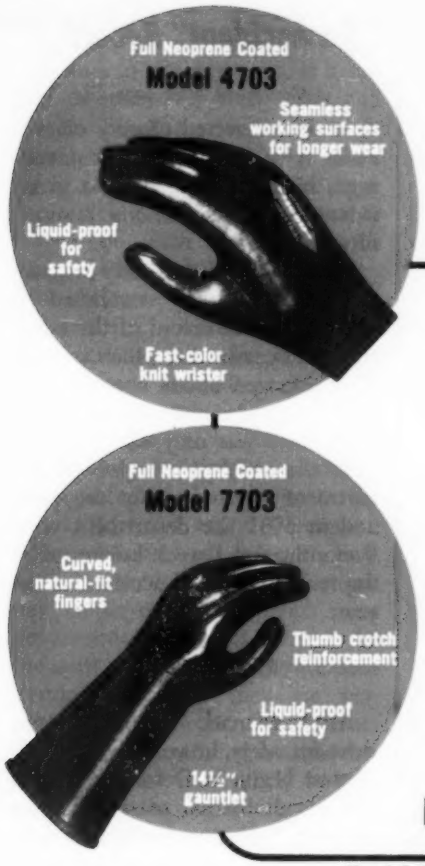
ESTIMATED fire losses in the United States during October amounted to $63,958,000, it is reported by the National Board of Fire Underwriters. This loss represents an increase of 17 percent over losses of $54,660,000 reported for October 1951, and an increase of 8.5 percent over losses of $58,949,000 for September 1952.

Losses for the first 10 months of 1952 now total $645,697,000, an increase of 7.1 percent over the first 10 months of 1951, when they amounted to $603,135,000. These estimated insured losses include an allowance for uninsured and unreported losses.

Fork Truck vs. Fire

CALLED away from carrying loads of industrial materials around the plant, a fork-lift truck is shown pressed into service to aid firemen in fighting a $50,000 crude rubber fire.

Burning at intense heat, the crude rubber had melted and spread the fire deep into the storage pile. The firemen extinguished the blaze by



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drenching the outside bales with water, and using the fork-lift truck to move them away so that hoses could get at the burning inside bales. This procedure saved almost two-thirds of the 315 thousand pounds of crude rubber stored in the yard.

Pictures by courtesy of Akron Beacon Journal through Yale and Towne Manufacturing Company.

Distillery Plant Fire Protection

THE staggering fire losses once experienced by the spirits distilling industry have been overcome largely through scientific fire-protective methods and efficient extinguishing equipment. Hiram Walker has established a program to give maximum protection against fire, which includes fire extinguishing equipment for production machinery and inventory, fire brigades and a safety educational program for all employees.

The company counts on its water sprinkler system for basic building fire protection. This system covers 99 percent of the distillery's buildings, which are spread over 36 acres. In the plant, only the still tower, power house, fermentors, and evaporators, on which water should not be used to extinguish fire, lack sprinklers. Office areas are also sprinklered. Thirty trained fire brigades, totaling 150 men, are assigned to all areas and departments of the plant. Members of each brigade are recruited from persons working in the plant area assigned to that brigade. This means that fire fighters, familiar with the area where a fire breaks out, are immediately available in a local emergency. Each brigade is trained in the use of portable equipment and receives instruction on potentially hazardous situations in the plant area in which it operates. Brigade members get detailed instruction as to the location and emergency operation of valves and other vital controls in their departments. Training stresses steps to be taken immediately, should fire flash. This is particularly important as more can be done to prevent a serious blaze in the first 5 minutes than in the following hours.

More than 1400 portable extinguishers, mostly carbon-dioxide and water units, are available

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(For full details, use Key # A-28 on free Inquiry Card on page 83)

throughout the plant for swift fire fighting. They are placed so that soda-acid or water units are located near common combustible materials; carbon dioxide, dry chemical or foam extinguishers are adjacent to flammable liquid hazards; and carbon dioxide, dry chemical or vaporizing liquid portables are available for electrical equipment fires. In addition to the recharge record cards, all of the units bear "how to use" and "on what type of fire" labels. A constant check is kept on the "safety status" of the plant. One man is employed by the protection and safety department who devotes his full time to checking fire-fighting equipment and safety conditions.

A visual education program for all employees is the primary method for general fire safety training. The plan is being rapidly expanded. A recent plant tour by more than 1,500 employees had an elaborate display of all fire-fighting equipment in the distillery as one of its highlights. Frequent articles in the company's house organ point out distillery hazards and the steps being taken to protect jobs and property against fire loss.

Fire-fighting technician inspects some of more than 1400 portable extinguishers furnishing fire protection to a large distillery.

Pictures by courtesy of Walter Kidde Corporation.

What's New?

See pages 76–78

"No Accident" Record

(Continued from page 18)

thoroughly covered. Safety officials claim these meetings are maintaining a high degree of interest in accident prevention among management personnel.

The success of the safety program can be most clearly established by referring to the record of the maintenance department, which prior to 1951 averaged about two lost-time accidents per month. The average work force was only 125 men. In 1951 the accident rate for the department began steadily dropping, and in 1952 the department went 9 months and 1 week before suffering its first lost-time accident of the year.

Rivalry In Safety

Most dramatic incident in the drive for safety, however, was a safety contest begun in October, 1951. It was a culmination of the foreman training and eye protection programs. During the contest the plant was divided into 12 divisions of about 200 employees each, set up on the basis of location and function of workers. Each division was eligible for an award each week and each month that it retained a record of no lost-time accidents. Awards, of a pair of safety shoes weekly and two savings-bonds monthly, went to employees selected by a drawing in each qualifying division. A total of 110 $25 savings-bonds and 247 pairs of workman's safety shoes were awarded during the contest. Large signs were erected in each division showing the daily and weekly safety records of the division. A great deal of friendly rivalry sprang up between departments over the length of time each department could go without a lost-time accident. Today, long after the close of the contest, departments still carry on this safety rivalry. As of July 1, 1952, the conventional washer final paint department had gone 2,525 days without a lost-time accident to hold top departmental honors in the company. Ten departments have gone 2 years without

suffering a lost-time injury.

Inaugurated with the safety contest, and still in existence, is a system of individual safety flags and blocks. On the first day of every month a small, green and white safety flag, a miniature of the large flag which flies above the plant, is placed on each superintendent's desk. As long as no lost-time accident occurs in the department, the flag remains. Should an accident occur, however, the flag is immediately replaced with a large red block. Of course, each superintendent strives to keep a flag on his desk by avoiding lost-time accidents in his department. In addition to the regular foreman training program, bulletin boards, signs and safety publicity, a safety briefing is given all new employees in the punch press department, which was found to be the most hazardous from an accident standpoint, before they are permitted to start work. This further decreases the possibility of accidents where they are most likely to happen. According to safety officials, the success to date in the reduction of accidents is due to the entire safety program, and not to any specific portion of it. Although a high degree of interest in safety was raised among the employees by the contest, the other aspects of the program have served to maintain that interest.

Most important in keeping employees safety conscious, officials claim, is the individualizing and decentralizing of safety. Each man on the job must be individually sold on the program and made aware of safety hazards and protective rules. Then it is up to him, personally, to follow the rules set and keep his own name off the accident list.

Pictures by courtesy of Whirlpool Corporation.

Safety Courses Offered By New York University

THE spring term of the evening program in industrial and traffic-safety training offered by the Center for Safety Education, New York University, begins February 3rd, 1953. The following will be offered in the spring term:

Safety Directors and Safety Engineers—Their qualifications, duties, and responsibilities.

Safety Organization: values and limitations.

Management and Supervision in accident prevention.

Psychology of accident prevention.

Industrial Safety: Industrial Hygiene and Occupational Diseases.

Traffic Safety: Operation of Fleet Safety Programs.

Special Problems in Accident Prevention.

Students may register for the spring term until 8 P.M., from January 19th to 22nd, and from February 2nd to 6th, 1953.

Clean...Dry...*Slip-safe* Floors IN JUST 90 SECONDS!

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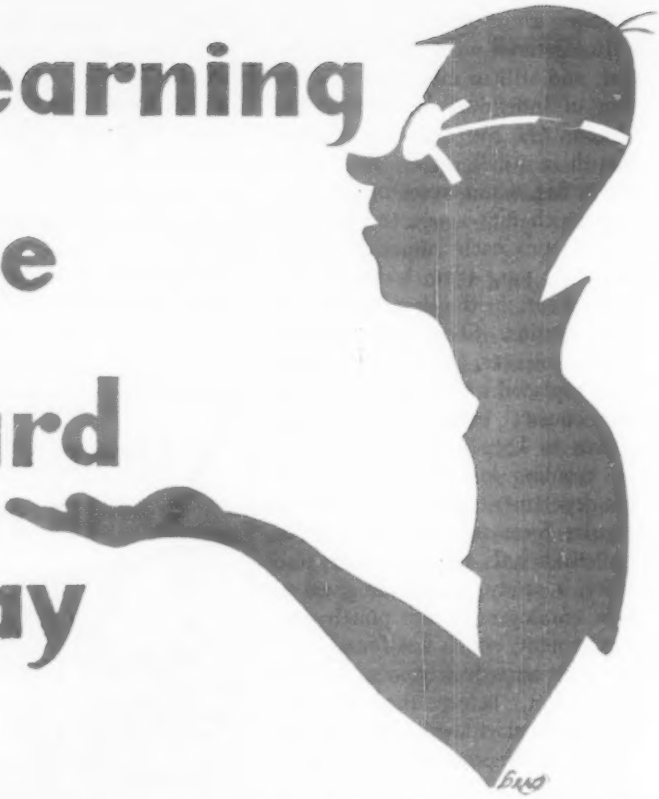
Learning the hard way



"FAMILIARITY BREEDS . . . CARELESSNESS"

A TURBINE-DRIVEN generator which had "operated perfectly" for a long time suddenly disintegrated. The turbine and generator were completely demolished. The turbine casing was smashed into numerous fragments and the shaft was found in 3 pieces. The cast iron frame surrounding the generator burst into relatively small pieces which flew in all directions. End rings were thrown from the revolving field. Copper wires forming the windings were a complete snarl. The generator shaft also broke in 3 pieces. The strange part of the accident was that no one was killed or injured. The breakdown started with the deterioration of a fiber washer hidden behind the arm of a field rheostat used with the 3 thousand K.W. turbine-driven generator. When this fiber washer broke and fell out, it apparently allowed the arm of the rheostat to drop of its own weight. This allowed the machine to "fall out of step" or out of speed control with the other machines. This accident illustrates how satisfactory operation of a machine over a long period of time can cause an engineer to lose sight of the fact that failure of a small part can eventually result in complete destruction of the machine itself.

THRICE TOLD TALE

ONE company has reported the case of an employee who is apparently haunted by a recurring type of accident. In his most recent scrape with an unkind fate, the worker was unloading steel plates when one of them slid off the pile, fell on his foot, fracturing the big toe and bruising another. A few months before this, the same man had reported to the hospital with a fractured great toe; and about a year previously, he had experienced another toe injury. We wonder if there really was an "unkind fate" at work here. Whatever the answer, it is about time that someone told him how safety shoes can prevent toe injuries.

TANK OVERFLOW

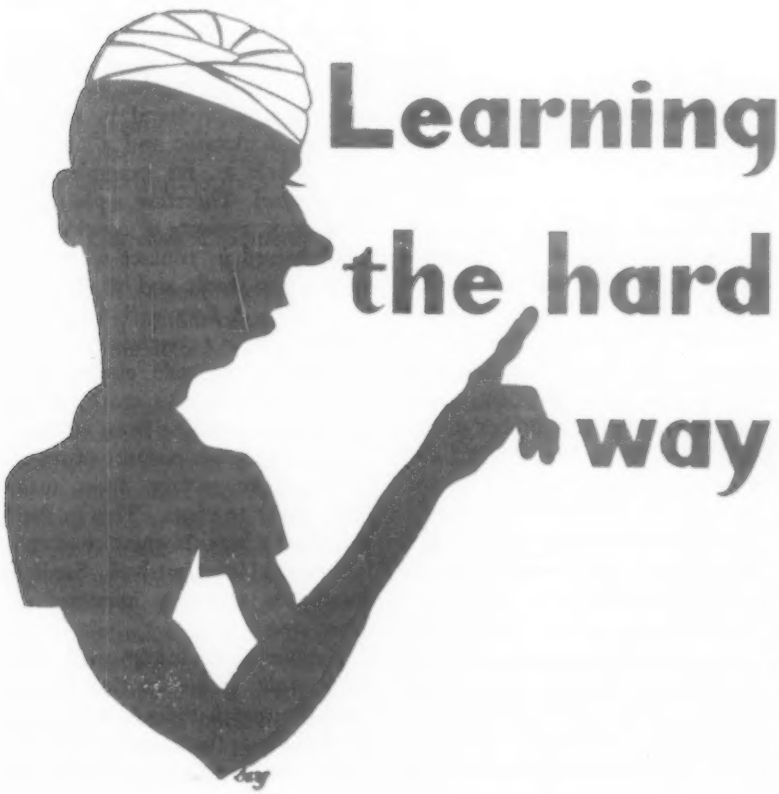
THE driver of a tank truck was discharging gasoline into the underground tank of a service store, using the power take-off. While the driver was inside collecting for the delivery, he noticed gasoline spurting out of the fill cap. He ran out to shut off the motor of the truck and to throw the pump out of gear, but as he jumped into the cab, the escaping gasoline vapors caught fire. The driver was burned on the hand, ear and leg; the tank truck was completely destroyed; two of the store's pumps were ruined; and the front of the store was badly damaged. The driver's idea of turning off the motor and pump was correct, but if he had used his head earlier, the emergency would not have arisen. There was no reason to use the power take-off to fill an underground tank, and he should not have been away from the truck during the delivery of the gasoline.

LOOK MA . . . NO HANDS!

AN ELECTRICIAN fell while descending a vertical metal ladder, and injured his head severely. The ladder had been provided with handrails, so safety officials were at first puzzled over the cause of the accident. The accident report brought to light the fact that the electrician had been carrying a lighted blow torch in one hand and a spanner wrench in the other at the time of the accident. This report only goes to show once more, what should be self-evident, that ladder workers must keep both hands free when ascending or descending. Tools should be carried in a tool belt or raised by rope.

WELDING FUMES

AN ARC welder recently inhaled the fumes produced by his welding and seriously injured his lungs. The fumes from nearly all metals are toxic. The effects of some are mild, while the fumes of others are fatal. The problem of welding fumes is complicated, too, by the fact that so much progress has been made of the compounding of alloys. It is the exception rather than the rule when a welder is called to work on a piece of pure metal. During welding operations, there should be good general ventilation. When inside, where there is no natural draft to carry the fumes away, an exhaust pipe with a wide opening should be placed beside the weld to draw the fumes away from the breathing area of the welder, or suitable respiratory protection should be provided.



Learning the hard way

MISHAP FROM MISSED WORD

A MAINTENANCE man was inspecting a crane. He asked an oiler if the switch was pulled. Told that it was, he touched the trolley wires, received an electric shock and fell from the ladder on which he was standing. His injuries included multiple bruises as well as electric burns. Investigation showed that the oiler had said the switch was pulled because he thought the maintenance man was referring to the cab switch instead of the main switch. This accident proves the validity of a basic rule for electricians and maintenance men: they must personally lock out switches before working on electrical equipment.

LIGHTS OUT!

A MAN was sent to a warehouse to get some paper bags. The fuse had blown and there were no lights. Instead of reporting this fact the employee tried to find the bags in the dark. He slipped and fell, injuring his back. This man had been warned previously against working in the dark, since he had received a minor injury before under similar circumstances, but he disregarded the rules once again. Now he has been told that he will be reprimanded if it happens again. It takes some people a long time to learn—even the hard way!

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Concrete Floors

(Continued from page 24)

of either the wax or oil film type will add greatly to the appearance and serviceability of colored concrete floors.

For curing colored floors only two methods are recommended: curing with waterproof paper and membrane curing. Other methods are likely to stain the floor, produce uneven colors or insufficiently protect the floor and cause efflorescence.

Static-Disseminating, Spark-Resistant Floors

Ordinarily it is not considered that a concrete floor presents any fire hazard. The floor itself is fire resistant and any tendency to sparking is negligible. In some buildings, however, such as airplane hangers, powder plants and paint shops, and under similar conditions of high explosion or fire hazard, static or mechanical sparks assume considerable importance. Whenever an industry has a fire hazard from combustible gases or dusts, as in the milling industry, or from the warehousing of volatile flammable liquids such as gasoline, avoidance of sparks from any source is vital. Sparks resulting from accumulations of static electricity are a common cause of ignition in accidental fires. Based upon investigation and experience, practical methods have been developed for the prevention or safe discharge of accumulations of static electricity.

The most commonly accepted methods of producing this type of floor are: (1) Metal floor coverings (copper, aluminum, lead, etc.). (2) Conductive linoleum, rubber and asphalt tile; bituminous mastic and magnesium oxychloride made conductive. (3) Carbon brick or blocks. (4) Specially prepared iron particles incorporated into the wearing surface of the concrete.

(Possibly many others are suitable, but as it is our purpose here to discuss concrete flooring for industrial wear, we will not attempt to cover any but the iron particle method, which lends itself best to this type of work.)*

Sources of Fire and Explosion Hazards

Where static charges are built up on equipment on the floor the danger of sparks from this source may be avoided if the floor itself is properly conductive. The charge can then be disseminated through the floor to ground.

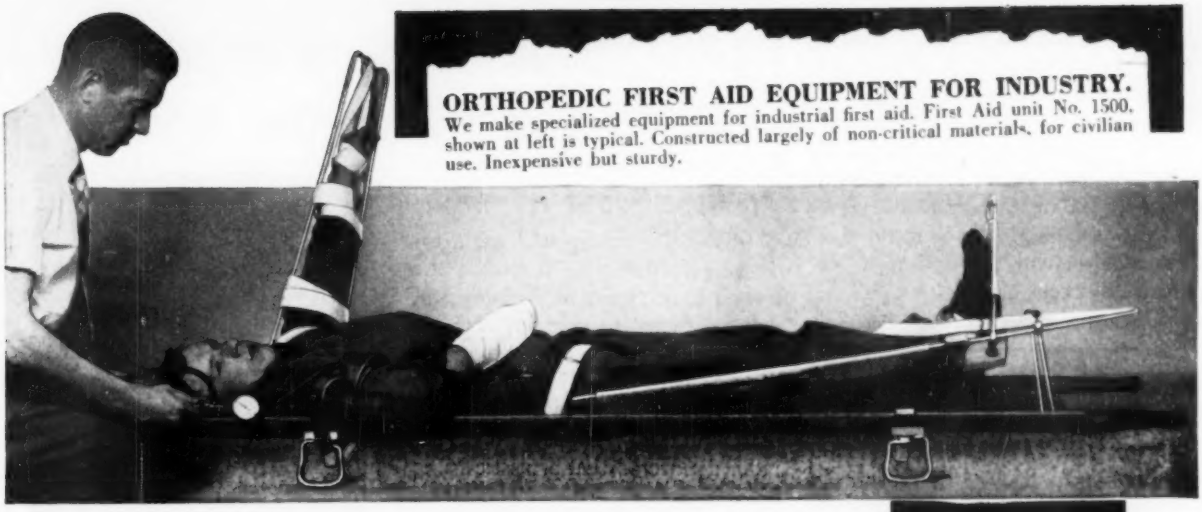
Hobnailed shoes and other metal articles may strike sparks on a concrete floor. Such mechanical sparks constitute a fire hazard. A concrete floor is a very poor conductor of electricity when dry. It is a fair conductor when wet, but it must be assumed that the floor or even an exterior pavement might be dry when the hazardous condition occurs. Therefore plain concrete cannot be expected to disseminate static charges.

Metallic Aggregates for Static Dissemination

The conductivity of a concrete floor is greatly increased by providing it with a metallic aggregate surface. To assure proper conductivity, application of ⅛ inch of iron armoring is necessary. It is sometimes thought a metallic surface floor will increase the danger of mechanical sparks. Actually, mechanical sparks are ordinarily produced by striking together a metallic and a non-metallic article as, for example, flint against steel. Therefore, a plain concrete floor presents a considerable spark hazard in contact with hobnailed shoes, tools, and other metallic articles. A floor with a metallic surface, such as a concrete floor with a metallic aggregate shake, practically eliminates this spark hazard. The greater freedom from inequalities and the lower porosity of metallic aggregate surface floors make them easier to clean. This in itself reduces fire hazards where combustible materials are involved. Sanitary conditions are also improved in other cases.

The metallic particles used must be carefully graded so that the cement content is reduced to a minimum. Thus, the metallic particles will be close together—providing the

* See Bibliography.



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Unit No. 1500 consists of: Pneumatic Tourniquet, Litter, Thomas Arm Splint (Rubber covered), Thomas Leg Splint—Half Ring (Rubber covered), Heel Rest, Ankle Hitch, Wrist Hitch, Leg Sling, Arm Strap, Carrying Case.

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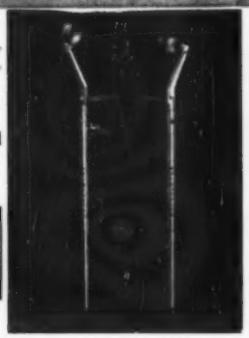

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required conductivity. The base mortar or concrete to which this metallic surface is applied must be placed fairly stiff to keep all the metallic aggregate at the surface and to prevent non-metallic aggregate from being worked up to the surface.

Corrosive Conditions

Portland cement itself is readily attacked by certain corrosive agents and is quite soluble in moderately strong acids. Under any alkaline condition a concrete floor will be satisfactory. Under any strong acid condition, a concrete floor is not to be recommended. Some other type of floor such as brick or vitrified tile should be used. There are, however, various intermediate conditions under which a concrete floor might or might not prove satisfactory.

A compilation of the effects of various materials on concrete floors, taken from data published by the American Concrete Institute ** is given in Table No. 1.

** See Bibliography.

TABLE NO. 1.

1. Substances which DO NOT attack unprotected concrete
   - Light fuel oils above 30° Baume
   - Volatile oils—kerosene, naphtha, benzine, gasoline
   - Heavy oils—30° Baume or heavier
   - Benzol, toluol, xylol, and cumol
   - Pitch, anthracene, carbonzol, and paraffin
   - Oxalic acid
   - Carbonic acid (dry)
   - Chlorides of sodium, potassium, calcium, strontium
   - Nitrates of calcium, potassium, and sodium
   - Soluble sulphides except sulphide of ammonia
   - Carbonates
   - Fluorides
   - Silicates
   - Ammonia water
   - Wood pulp
   - Tanning liquors (non-acid)
   - Alcohol

2. Substances which VERY SLIGHTLY attack unprotected concrete
   - Poppy seed oil
   - Walnut oil
   - Soy bean oil
   - Peanut oil
   - Fish oil
   - Lard and lard oil

3. Substances which SLIGHTLY attack unprotected concrete
   - Linseed oil
   - Resin
   - Cocoanut oil
   - Olive oil
   - Rape seed oil
   - Cotton seed oil
   - Almond oil
   - Molasses
   - Sulphite liquor
   - Corn syrup and glucose
   - Sulphide ores and pyrites
   - Chlorides of magnesium, iron, mercury, copper and ammonia

4. Substances which SLOWLY ATTACK unprotected concrete
   - Phenol, Cresol, lysol, creosote, carbolineum
   - Carbonic acid in water
   - Lactic or tannic acids
   - Milk
   - Silage juices

5. Substances which STRONGLY attack unprotected concrete
   - Acid sulphate

6. Substances which ACTIVELY attack unprotected concrete
   - Sulphates of calcium, potassium, sodium magnesium, copper, zinc, aluminum, manganese, iron, nickel and cobalt

7. Substances which SLOWLY disintegrate unprotected concrete
   - Acetic acid

8. Substances which DISINTEGRATE unprotected concrete
   - Sulphuric acid
   - Nitric acid
   - Sulphurous acid
   - Hydrochloric acid
   - Hydrofluoric acid
   - Sulphates of ammonia
   - Nitrate of ammonia

For the substances in Group 1 no treatment is required to protect the concrete. For substances under Group 2 to 4 inclusive, and Group 7, various treatments are recommended, but it is doubtful that these would be effective on floors. For Groups 5 and 6 certain surface treatments are offered, but the alternative is suggested of using some material other than concrete, such as glass, vitrified brick or tile and rubber, as

is also the case for some of the substances in Group 3 (slight attack). For the inorganic acids of Group 8, recommendation is made for the use of some material other than concrete. For the remaining members of the group, there is an alternative of a surface treatment. However, no surface treatment can be counted on as a permanent solution to a corrosive problem of floors.

(Continued next column below)

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SAFETY MAINTENANCE & PRODUCTION Salutes a Safety Idea for JANUARY

Air Hose Guard

HERE'S a clear plastic guard for an air blow-gun. It enables the worker to see what he is doing and deflects flying particles away from his eyes in air-cleaning operations. An employee of the C. A. Norgren Company, manufacturer of pneumatic products, Englewood, Colorado, discovered that a plastic baffle plate, a part in one of the company's products, could easily be installed on his air-gun. He submitted his suggestion and the alert company adopted the idea. Result: flying metal particles, which have long been a hazard in air-cleaning castings and machined parts are rendered more harmless by a new safety device.

Concrete Floors

(Continued from first column)

The greatest difficulty in deciding to use a concrete floor arises from those intermediate conditions where a concrete floor of high quality might not prove serviceable. A practical rule would appear to be that under acid conditions, including conditions where acid is produced by the decomposition of organic matter, a portland cement floor should not be used unless evidence shows that such a floor would withstand the particular conditions involved.

Unfortunately, the possible conditions which might be encountered in industry are so varied that it is a practical impossibility to make actual tests which cover all the possibilities. Concrete floors are certainly not to be recommended when exposed to strong mineral acids. Acid sulphate salts, such as aluminum sulphate, also have a very deleterious effect. With the weak organic acids it is sometimes possible to produce concrete floors which will give good service but this depends on the conditions in each case. Neutral sulphates attack concrete, but it may be protected against them. Alkaline solutions, unless very strong, are not usually injurious and neutral salts which are not sulphates usually have little effect.

Soluble salts, even though neutral, may attack a concrete floor, through crystal pressure rather than by corrosion. If the salts in solution are carried into the floor and if the water evaporates, the structure of the cement paste may be broken down by the growth of salt crystals within the pores of the concrete. The best protection against attack of this type is a floor with very low or no porosity. Generally speaking, corrosive attack on portland cement itself is so rapid, that the resistance of the aggregate has no significant effect on the rate of disintegration. By making the floor less porous and more resistant

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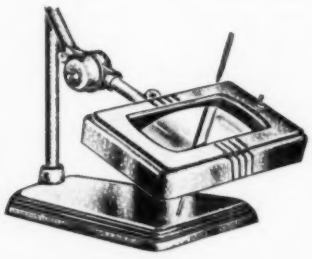

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to wear in the first instance, the life of the floor under corrosive conditions will be prolonged.

Non-Slip Finishes

In most areas concrete floors do not present a problem with respect to slipperiness. Even when smooth they are not inherently very slippery. In certain instances, however, this factor may be of some importance. This may be the case on inclined areas such as ramps, on stair treads, and in factory areas subject to oil and grease.

One means of producing a non-slip cement floor surface is to introduce into the surface an exceptionally hard aggregate. For this purpose fused or sintered aluminum oxide (alundum) or silicon carbide (carborundum) have been used. Another method of producing a rough non-slip surface is to place and finish the floor in the usual manner by floating and trowelling. Immediately after the last trowelling, but before the floor has hardened so that it cannot be worked, ridges are brought up on the surface by going over it with a wood float, or with a trowel held flat or with a mechanical float. Brooming is also used in some cases. In the hand method a circular motion is used for the last operation. By these means circular ridges are brought up on the surface which give excellent non-slip qualities. Care should be exercised not to exaggerate the roughness by producing deep depressions and high narrow ridges. Such high ridges wear rapidly with undesirable dusting and contribute nothing to non-slip qualities after a very short time. Floor wear is unduly accelerated.

Fig. 8. Floor with a swirled finish. Power float was used after trowelling. This floor has metallic particles upended to provide resistance to wear.

An improvement in the wearing qualities of this type of non-slip finish is secured by incorporating metallic aggregate in the surface of the floor. The floor is laid and floated in the usual manner. The metallic aggregate shake is dusted over the surface, floated in and trowelled. After a second trowelling the mechanical float is run over the floor, or the floor is flat trowelled by hand with a rotary motion. This brings up circular ridges which make the floor non-slip even when subject to oil. The metallic aggregate con-

(Continued on page 61)

wear a

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More than 24 sq. in. twin filter area. Sanitary face cloth. Soft rubber face mask. Has all patented DUPOR features including bulb valve-controlled breathing—panorama view with no blind spots. A favorite for years!

Sample sent $3.00 ppd

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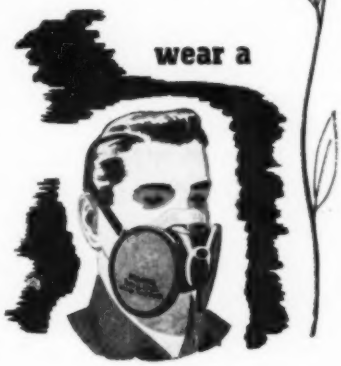

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INSIDE THE TRADE

Gro-Cord Rubber Appoints

GRO-CORD Rubber Company with plants in Lima, Ohio and Tillsonburg, Ontario, announce the appointment of D. J. Wriggelsworth to the newly created position of Industrial Sales Promotion Manager.

Mr. Wriggelsworth has been with the company since 1934 and has served Gro-Cord in many capacities including Plant Production, Personnel Manager, Assistant Purchasing Agent and until now as Assistant Sales Manager.

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Pittsburgh Plate Glass Appoints

APPOINTMENT of Alan B. Castator as general sales manager for Pittsburgh Plate Glass Company brush division factories at Baltimore, Md. and Keene, N. H. has been announced by E. D. Peck, vice president in charge of the firm's paint and brush division.

Associated with Pittsburgh Plate Glass since 1931, Mr. Castator previously served in sales capacities at Philadelphia, as manager at the Atlantic City store, and during the past five years as assistant manager at the Detroit warehouse.

Stop-Fire Plans New Lab

PLANS for a new chemical research laboratory with facilities for expanded study and development of chemical fire extinguishants, have been announced by Stop-Fire, Inc., fire extinguisher manufacturer, Brooklyn, N. Y.

The laboratory will be established in an improved 2-story building just purchased by Stop-Fire and adjacent to the company's main plant. The building will also in part be used for increased production of a new free-flowing dry chemical extinguishant developed and recently introduced by Stop-Fire.

Yant Elected as N.S.C. Industrial Vice-President

DR. WILLIAM P. YANT, director of research and development for Mine Safety Appliances Company has been elected vice-president for Industry of the National Safety Council, and chairman of that organization's Industrial Conference.

Dr. Yant, a member of many technical societies, was the first president of the American Industrial Hygiene Association. In 1947 he received the association's award for outstanding service in industrial hygiene. He was chairman of the steering committee for the President's U. S. Technical Conference to study air pollution in 1950. For the past five years Dr. Yant has been chairman of the Research Committee of President Truman's Conference on Industrial Safety.

Gray Iron Founders Society Elects

AT THE recent convention of the Gray Iron Founders' Society, Inc., in Cleveland, Ohio, the following officers and directors were elected: H. J. Trenkamp, The Ohio Foundry Co., Cleveland, Ohio, President; T. I. Curtin, Jr., Waltham Foundry Co., Waltham, Mass., Vice President; C. H. Ker, Dalton Foundries, Inc., Warsaw, Indiana, Secretary and W. O. Larson, The W. O. Larson Foundry Co., Grafton, Ohio, Treasurer.

Chicago Firm Names Three Board Executives

THREE top industrial executives: Dr. Harry K. Ihrig, vice-president in charge of research, Allis-Chalmers Mfg. Co., Milwaukee; John Cleaver, president, Cleaver-Brooks Co., Milwaukee; and James M. Phelan, partner, A. T. Kearney & Co., Chicago, are new members elected to the Board of Directors of Nuclear Instrument & Chemical Corporation, 229 West Erie Street, Chicago, at the annual stockholders meeting. James A. Schoke, president, made the announcement. Nuclear produces instruments for the handling and measuring of radioactive materials and manufactures several radioactive chemicals.

Free Bulletins & Catalogs
See page 83

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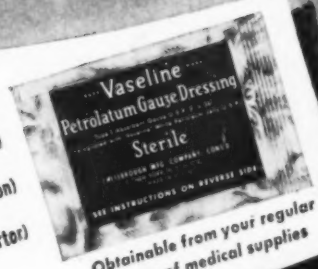

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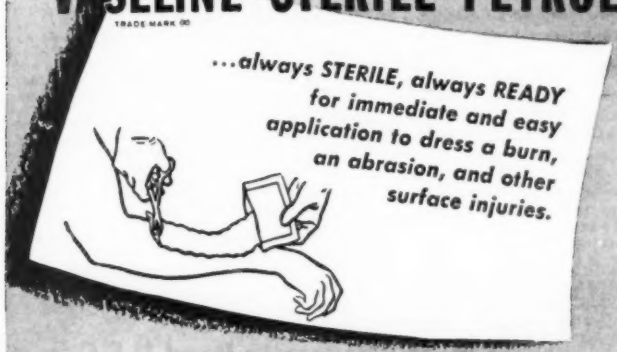

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Concrete Floors

(Continued from page 59)

tained in these ridges imparts a higher degree of wear resistance, so that the ridges do not wear off quickly.

Repairs, Resurfacing & Maintenance

Floors are sometimes so poorly built or have been subjected to such extreme conditions as to be wholly inadequate for further service. In such cases it is advisable to remove the defective top surface and replace it with a new one.

Materials available for resurfacing range from pure asphalts through asphalt cement mixtures. Some are ready-to-use and some must be mixed on the job. Some are non-slip and some acid resistant and water resistant. Generally if the area is of any appreciable size, it will be found that the most economical and practical resurfacing material for a concrete floor is concrete.

Problems of Resurfacing

Here are several points which come up when resurfacing with concrete: (1) A new layer of concrete *cannot* be put on less than ¾ to 1 inch thick (which therefore involves either raising the floor level or cutting away the old concrete to that depth). (2) It is rather difficult to bond a large area of new concrete to an old slab, due to the shrinkage that must occur. Extreme care in the following of recommended procedures is essential. (3) If the old floor was unsatisfactory in the first place, a higher-strength, longer-wearing surface is probably desired for the new topping.

Bonding and shrinkage problems can usually be solved through use of a non-shrink metallic aggregate, which expands during the setting of the cement to counteract the shrinkage which normally occurs. Successful resurfacing jobs using such materials to counteract shrinkage have found widespread acceptance. The various available floor hardeners should be investigated to produce the quality of floor desired.

Cracking

Cracks in concrete floors may be classified as (1) structural cracks originating in the base and extending through the finish, and (2) cracks confined to the wearing course. The latter may extend through the wearing course, or may be of a superficial nature, ordinarily called hair cracks or crazing.

Structural cracks may be caused by shrinkage, temperature changes or settlement. If there is recurrent movement, there is little that can be done other than to keep them filled with a mastic material. Crazing cracks may be removed by grinding if they are not too deep. The only other method of removing them is to remove the affected area and replace it with new material.

In some cases cracks may be filled with varnish or resin. Although the cracks will remain visible, accumulations of dirt and leakage will be

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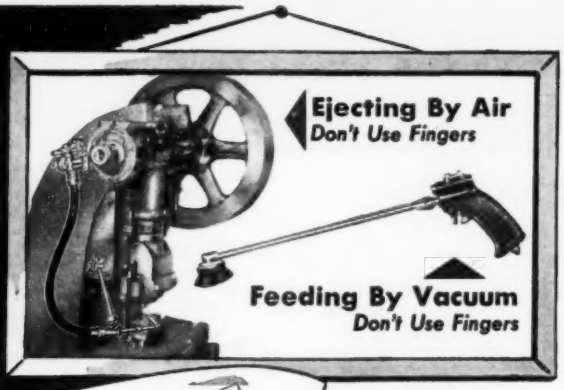

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prevented. Artificial resins, available through paint and varnish manufacturers, may be used. They should be powdered and dissolved in a suitable solvent such as xylol, in the approximate proportion of 6 pounds of resin to a gallon of solvent. A varnish-like material is produced which can be run into the cracks. Cement may be added to make a thicker solution for wider cracks.

Patching

In patching concrete floors, the old wearing surface should be chipped off to a depth of at least 1 inch. Do not attempt to install a concrete patch with feathered edges. It will break out. The roughened surface should be thoroughly cleaned of loose particles and saturated with water for several hours before placing new concrete. The area surrounding the patch should be wetted also.

Strike off the newly installed concrete slightly above the level of the existing floor. Then let it set for 1 or 2 hours before final trowelling. This procedure will allow some shrinkage to take place and result in the patch being approximately level with the rest of the floor. Here again, it may be found that non-shrinking patches (obtained through the use of intermixed metallic particles) may be desired.

Roughened Floors

Floors may become roughened under service, or pitting may occur from heavy impacts. Sometimes floors may be put into satisfactory condition by grinding off the roughened surface. On the other hand, if the concrete is of such poor quality that the surface will soon become roughened or pitted again, it would be more economical to resurface the floor with the proper quality of concrete.

Even with all the information on floors that has been published, special problems will undoubtedly continue to come up. It is suggested that the representatives of reputable manufacturers of flooring materials be called upon for consultation service. Many of these firms have research departments of their own, and their representatives have considerable practical experience in solving difficult floor problems. They may have data at their finger-tips which might give you the answer to your problems.

Pictures by courtesy of The Master Builders Company.

Bibliography

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"Concrete Floor Finishes"—Portland Cement Association.
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"How to select SAFETY FLOORING for Chemical Plants"—C. L. Jones, Safety Engineer, Hercules Powder Co., Wilmington, Delaware, from "Chemical Industries"—March, 1947.
Research Paper RP 1252—National Bureau of Standards.
Report of the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete—Recommended Practice and Standard Specifications for Concrete and Reinforced Concrete—American Concrete Institute, June, 1940.

Rogers to Head N.S.C.'s Public Utilities Section

W. T. ROGERS, Ebasco safety consultant, has been elected Chairman of the executive committee, Public Utilities section of the National Safety Council. Mr. Rogers has the distinction of having been chairman of all three safety committees serving the utility industry —the accident prevention committee of the Edison Electric Institute—the accident prevention committee of the American Gas Association and the National Safety Council public utilities section.

Army-NYU Safety Class Is 89th to Graduate

THE human factor in safety education was emphasized at a luncheon commemorating the 10th anniversary of the Safety Training Course for the Military Establishment conducted by New York University's Center for Safety Education.

Presenting certificates to 30 offi-

cers and civilians, members of the 89th class to complete the joint N.Y.U.-Army program, Dean Paul A. McGhee of the university's division of General Education, pointed out that, "The cause of safety today means human lives—not the cost of the jeep that is wrecked but the loss of the boy behind the wheel who may be your boy, or mine, or our neighbor's."

In a letter read by his representative, Col. Ned D. Moore, Chief of Military Personnel Management, Lieutenant General A. C. McAuliffe, Assistant Chief of Staff for G-1, traced the increase in safety efficiency in the Army over the past few years and declared that the work at the N.Y.U. Center for Safety Education has "contributed greatly to the improvement in preventive effort."

Dr. Herbert J. Stack, director of the N.Y.U. Center for Safety Education, gave a history of military safety operations conducted over the past ten years under the military training program, and Dr. Walter Cutter, director of the military training program, served as toastmaster.

The 89 classes held in the area since November, 1942, have been given for safety officers and civilian safety personnel from Army installations in all parts of the world. In addition, hundreds of 3-day seminars have been held throughout the country at all Army commands and important headquarters for the benefit of safety personnel.

Ladder Safety Code

A SAFETY code prescribing rules and requirements for the construction, care, and use of the common types of portable wood ladders (A14.1-1952) has just been approved by the American Standards Association.

Designed for the voluntary use of ladder manufacturers, these specifications will also serve as the basis of purchase requirements on the part of the many types of establishments that use ladders. There will also be an instruction guide in personnel training in safety practices and in the preparation of safety manuals and safety posters. State authorities and other regulatory bodies will find them helpful as a guide in the formation of laws or regulations.

The new standard covers definitions of types of ladders, recommendations as to materials for ladders—including a classification of the various species of wood-construction requirements, and the care and use of ladders.

Copies of the American Standard Safety Code for Portable Wood Ladders, A14.1-1952, are available from the American Standards Association, 70 East 45 Street, New York 17, N. Y. at 75 cents per copy.

Pre-Check of New Products for Hidden Hazards Urged

A THOROUGH investigation of all new products for hidden accident hazards by their manufacturers was urged by John V. Grimaldi, director of the industrial division of a leading insurance association before the annual meeting of The American Society of Mechanical Engineers. Mr. Grimaldi said that "too often dangerous new products reach the market causing destruction to property, injuring the public or harming its health. Just as frequently new products have damaged manufacturing plants and surrounding buildings or have injuriously affected employees."

"The question," he continued, "is not whether the manufacturer is right or wrong concerning the hazards of his product. He must know and be able to prove that his product is free from hidden hazards when any liability claims are made against him. Although a manufacturer is not yet required to produce an 'accident proof' product free of both latent and recognizable hazards, he is often called upon to defend such suits."

An informed and claims-conscious public, laws and regulations and the reduced opportunity to accumulate profits make it financially unwise to undertake to manufacture and market a product unless it and its production have been thoroughly studied, Mr. Grimaldi explained. Every manufacturer of new products should first determine what laws or regulations, if any, govern the product that he is manufacturing. Many states have laws pertaining to pure foods, drugs and cosmetics. Laws vary in each state and great importance is placed on such things as labeling, ingredients and particularly, instructions for use and guarantees.

He also recommended that manufacturers have a laboratory check: inherent hazards of the product that may affect the plant structure or equipment; health hazards to production personnel; the production process itself; the possibility of injuring the public through use of or exposure to the product; and hazards to users' property.

NYU Issues Handbook For Accident Prevention

A NEW handbook entitled "Training for Industrial Accident Prevention" has been published by New York University's center for safety education in cooperation with the American Museum of Safety. Designed for industrial executives as well as colleges and universities now providing or planning to inaugurate industrial safety programs, the booklet includes material on all phases of the field.

Dr. Walter A. Cutter and Dr. J. Duke Elkow co-authored the new work and have included sections on the industrial accident-prevention specialist and his functions, training for safety in engineering and technical schools, training in accident prevention in non-engineering colleges, schools and departments and recommendations for training in industrial accident prevention.

THE Future SHOWS

Cleveland, Ohio

January 19–22. Fourth Annual Plant Maintenance Show & Conference, (Public Auditorium). Clapp & Poliak, Inc., exposition managers, 341 Madison Ave., New York 17, N. Y.

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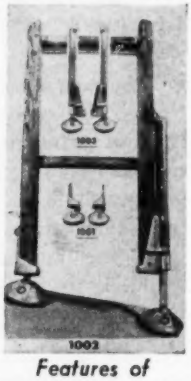

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(Use Key # A-39 on Inquiry Card on page 83)

Milwaukee, Wis.

January 29–30. Eleventh Annual Meeting & Exposition Wisconsin Council of Safety and Industrial Nurses Section, State Nurses Association (Hotel Schroeder). R. W. Gillette, secretary Wisconsin Safety Council, State Office Bldg.—Room 234, 1 W. Wilson St., Madison 2, Wis.

Los Angeles, Calif.

February 13–14. General meeting of the California Industrial Safety Conference (Statler Hotel).

Atlanta, Ga.

March 1–3. Thirteenth Southern Safety Conference & Exposition. (Atlanta Biltmore Hotel). W. L. Groth, executive director, P. O. Box 8927, Richmond 25, Va.

Philadelphia, Pa.

March 3–4. Nineteenth Annual Philadelphia Regional Safety & Fire Conference & Exhibit (Bellevue-Stratford Hotel). W. W. Matthews, Managing Director, Philadelphia Chamber of Commerce Safety Council, 17th & Sansom Sts., Philadelphia 3, Pa.

New York, N. Y.

March 24–27. Twenty-third Annual Greater New York Safety Convention & Exposition. (Hotel Statler). E. Willard Merritt, general chairman, Greater New York Safety Council, Inc., 60 E. 42nd St., New York 17, N. Y.

Boston, Mass.

March 30–31. Thirty-second Annual Massachusetts Safety Conference & Exposition (Hotel Statler). Edgar F. Copell, President-Director, Mass. Safety Council, 31 State St., Boston 9, Mass.

Kansas City, Mo.

April 9–11. Central States Safety Congress (Hotel President). George M. Burns, Director, Kansas City Safety Council, 419 Dwight Bldg., Kansas City 6, Mo.

Indianapolis, Ind.

April 14–15. Central Indiana Safety Conference (Claypool Hotel). Jack Gunnell, Indianapolis Chamber of Commerce, 320 N. Meridian St., Indianapolis 11, Ind.

Toronto, Ont.

April 20–21. Annual Conference of Canadian Industrial Accident Prevention Associations (Royal York Hotel). R. G. D. Anderson, general manager, Industrial Accident Prevention Associations, 600 Bay Street, Toronto 2, Canada.

Grand Rapids, Mich.

April 21–23. Michigan Safety Conference and Exhibit (Civic Auditorium). Elon J. Schantz, executive secretary, Consumers Power Co., 129 Pearl St., N. W. Grand Rapids 2, Mich.

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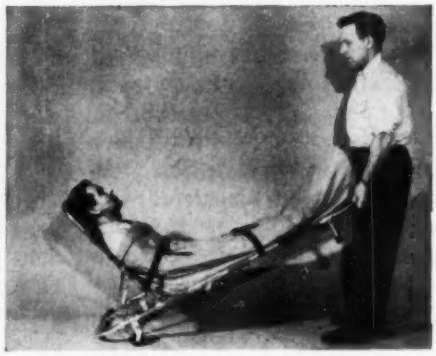


(For full details, use Key # A-40 on free Inquiry Card on page 83)

Charleston, W. Va.

April 22–24. Annual Conference & Exhibit West Virginia Safety Council, Inc. Mrs. W. C. Easley, 316 Masonic Bldg., Charleston, W. Va.

Bridgeport, Conn.

April 23. Eighth Annual Connecticut Industrial Safety Conference (Hotel Stratfield). H. R. Erickson, manager, Connecticut Safety Society, c/o Chase Brass and Copper Co., Waterbury, Conn.

Phoenix, Ariz.

April 27–29. Fifteenth Annual Western Safety Conference Inc. Conference and Exhibit (Hotel Stratfield). H. E. Hodgson, secretary, 310 Luhrs Bldg., Phoenix, Ariz.

Pittsburgh, Pa.

April 28–30. Twenty-eighth Annual Western Pennsylvania Safety Conference & Exhibit. Harry H. Brainerd, executive secretary, 605 Park Bldg., Pittsburgh 22, Pa.

Roanoke, Va.

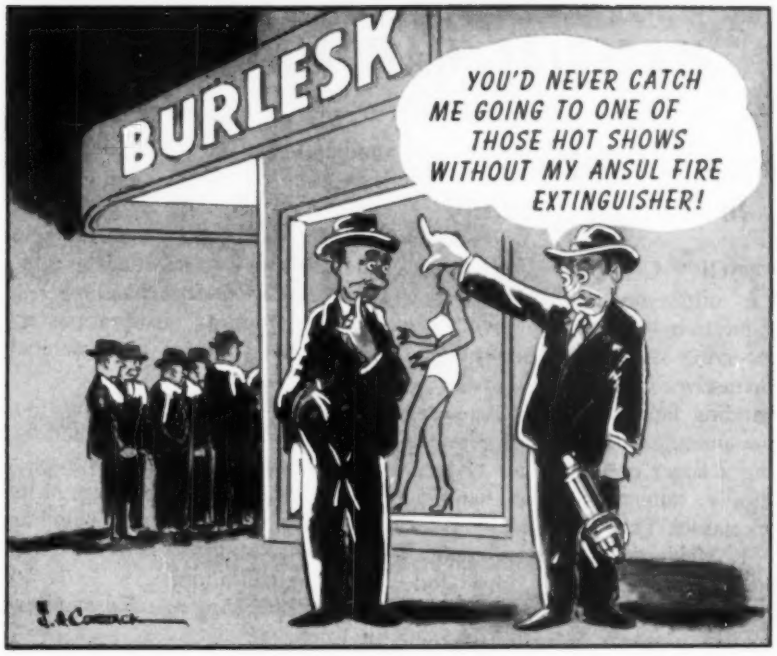
May 7–9. Nineteenth Annual Virginia State-wide Safety Conference (Hotel Roanoke). William M. Myers, managing director, Richmond Safety Council, 49 Allison Bldg., Richmond 19, Va.

Winston-Salem, N. C.

May 13–15. Twenty-third Annual North Carolina Industrial Safety Conference (Robert E. Lee Hotel). H. S. Baucom, safety director, North Carolina Industrial Commission, Raleigh, N. C.

Syracuse, N. Y.

May 14–16. Central New York Safety Conference and Exposition (Hotels Syracuse and Onondaga). Walter L. Fox, Safety Division, Syracuse Chamber of Commerce, Syracuse, N. Y.



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SEE PAGE 14

Materials Handling Show

THE fifth National Materials Handling Exposition, which will be held at Convention Hall, Philadelphia, May 18 to 22, will be the largest capital goods show to be held anywhere in the country during 1953, it has been announced by Clapp & Poliak, Inc., exposition managers.

The exposition, held for the first time in 1947, is expected to attract 25 thousand visitors from 40 countries. The Material Handling Institute, organization of handling equipment manufacturers, will sponsor the exhibition. Concurrently with the show, the American Materials Handling Society, composed of executives of companies which use materials handling systems, will conduct a series of conferences.

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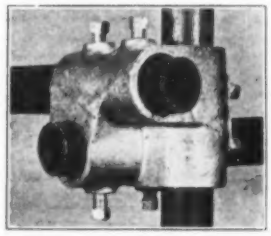

AMIDON ENGINEERING CO. **ELYRIA 18, O.**

(For full details, use Key # A-41 on free Inquiry Card on page 83)

MATERIAL HANDLING NEWS

Education Methods In Material-Handling

THE College-Industry Committee on Material Handling Education—organized to enable engineering students to better equip themselves for the future in the expanding field of material handling has announced methods of stimulating a larger national force of technically trained material handling specialists. They include:

1. Making available to educational institutions and other study groups material of recognized quality for use in courses on material handling.

2. Initiating the development of new teaching aids not presently available for use in such courses.

3. Becoming known as a source and authority on sound, accurate information on material handling education.

4. Promoting an understanding in Industry and Education of the value and nature of material handling.

5. Determining qualifications required by Industry and material handling men.

6. Developing and promulgating the principles of material handling organization and management.

7. Facilitating the exchange of information among material handling teachers as an aid to better material handling education.

8. Encouraging material handling research.

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Write for the complete story on Acme Gas Masks for all occupational hazards.

ACME PROTECTION EQUIPMENT COMPANY

3037 West Lake Street, CHICAGO 12, ILLINOIS

(Use Key # A-42 on Inquiry Card on page 83)

Material Handling System Pays Safety Dividends

INTEGRATED material handling systems, making use of the most up-to-date thinking on handling goods will pay dividends in safety as well as in increased production and lower costs, Jervis C. Webb, executive vice-president of the Jervis B. Webb Company, told the annual meeting of The American Society of Mechanical Engineers.

"Conveyors, automation devices, cranes, industrial trucks—all are available to become part and parcel of the handling plan of industry," he stated. "Also, reasonable and intelligent codes are being developed to provide the specific and general features of safety that will further make for proper safeguards. These added to the furtherance of freedom provided by mechanical systems . . . can only bring good results for all."

Among the costs which industry may cut are: goods in process, manpower, bottlenecks in production and improper scheduling, Mr. Webb continued. The insertion of mechanical equipment to handle the products from raw material to finished product on a more or less continuous basis would tend to cut these problems down to size and bring them into sharper focus for better analysis.

Flammable Liquids

(Continued from page 28)

by the use of compressed air both from the viewpoint of ordinary combustion and over pressurizing equipment. The displacement of flammable liquids by compressed gases from drums which have not been designed especially for the purpose can be exceedingly hazardous to life and property and should be forbidden.

Automatic Metering

Where process requirements necessitate the use of large quantities of flammable liquids, the advantages of suitable automatic metering equipment are evident. These generally include a reduction in handling costs, and an improvement in process control. In addition, a material reduction in the inherent hazard is accomplished through the use of an automatic shut-off feature operating after a pre-determined quantity has been withdrawn.

Pumping systems not equipped with automatically operated switches or shut-off valves are but little better than systems having gravity flow.

Serious losses to life and property have resulted from leaks in piping passing through basement areas. Good engineering design calls for locating these liquid carrying lines in places other than basement areas, tunnels, pipe shafts and stair or elevator towers. It is sound practice to locate and install piping which is securely supported and properly protected against mechanical injury. In addition, to preclude the possibility of serious accidents, all piping carrying hazardous materials whether in liquid or gaseous state should be clearly marked at frequent intervals in accordance with an established identification system, including both coloring and stenciling.

Pictures by courtesy of Factory Insurance Association.

industrial Hygiene

ASSOCIATE EDITOR
JACOB A. GOLDBERG, A.M., Ph.D.

Industrial Ventilation Conference

THE Second Annual Industrial Ventilation Conference will be held at the Kellogg Center on the Michigan State College campus February 16–19, 1953. This school is co-sponsored by the School of Engineering, Michigan State College, and the Division of Industrial Health, Michigan Department of Health. It is devoted to the teaching of the practical application of exhaust systems for the control of industrial contaminants.

According to those attending last year, the outstanding feature of this Conference is the class room sessions. Those attending will have a choice of working out in small groups, each group aided by an experienced engineer acting as instructor.

There will also be talks and demonstrations by experienced field men on such subjects as duct design, fans, selecting air tempering units, etc.

Industrial Hygiene Award

WARREN A. COOK, director, division of industrial hygiene and engineering research, Zurich-American Insurance Companies, has been selected to receive the Donald E. Cummings Memorial Award of the American Industrial Hygiene Association for 1953. The award, is made in recognition of "outstanding contribution to the knowledge and practice of the profession of industrial hygiene."

Mr. Cook has served as president of the American Industrial Hygiene Association; editor of its quarterly publication; and associate editor of the *Journal of Industrial Hygiene and Toxicology* and also of *Industrial Medicine and Surgery*. He is perhaps most widely known for his report on "Maximum Allowable Concentrations of Industrial Atmospheric Contaminants," which is used extensively as a reference work in this field.

Radioactive Waste Control Protects Nearby Areas From Air-Pollution

THE safe operation of an atomic energy laboratory in a heavily-populated area was described to the Fifth Annual Conference on Instrumentation and Nucleonics in Medicine by Joseph J. Fitzgerald, scientist at the Knolls Atomic Power Laboratory, Schenectady, N. Y.

According to Mr. Fitzgerald, waste gases, as finally discharged into the air from the laboratory, are no more radioactive and often less so than the surrounding atmosphere. He explained that a constant study is made of the waste gases discharged into the air, in order to afford maximum protection to the neighborhood. These gases are discharged through a 100-foot stack, and are constantly monitored to make sure that the concentration of radioactive material is kept well below permissible limits.

"Constant air monitors are located at selected sites to check the radioactive concentrations at various points near ground level. Plant samples also are analyzed on a regular schedule to evaluate the accumulation of radioactivity on vegetation," Mr. Fitzgerald said.

Describing the safety operations, he said the waste radioactive gases and smokes from the working areas are first passed through a "scrubber," in which a caustic solution washes out the larger radioactive particles as well as the more volatile components. Next they go through a high-efficiency filtering system, which removes more than 99.9 percent of the radioactive material left. The air that remains is diluted, from a thousand to ten thousand times, with filtered air from the ventilating system of the building, and then is discharged through the stack.

What's New? See pages 76–78 and use the Readers Inquiry Card on page 83

CUT THE RACKET!

By JOSEPH SATALOFF, M. D.
Director of Hearing Center & Research
University of Pennsylvania

Noisy Industries Should Install Hearing Conservation Programs

IT HAS been assumed that noise associated with certain jobs produces hearing loss. This fact has been so marked that the conditions have become known as boilermakers' deafness, weavers' deafness, and gunfire deafness.

The responsibility of handling the over-all problem of hearing loss in industry lies chiefly with the industrial physician and hygienist in cooperation with the safety engineer and all others responsible for the health of personnel. The importance of establishing comprehensive hearing conservation programs is obvious for three principal reasons: First, the medico-legal, next, the prevention of deafness, and third, for scientific research purposes.

There is little need to go deeply into the medico-legal aspect, but a number of large industries are now entangled in multi-million dollar claims on the basis of occupational deafness. The military services are also vitally concerned because of the compensation problems resulting from exposure to acoustic trauma of gunfire, airplanes, large engines and industrial machines.

The importance of the prevention of deafness is self evident. As for scientific research, to date it demonstrates that there is still much uncertainty concerning the intensity and type of noise which can produce deafness. There is extensive disagreement concerning the maximum safe intensity levels, that is, the loudest noise to which nearly all individuals may be exposed without suffering any hearing damage.

Safe Intensity Levels

During recent years estimates by various investigators of maximum safe intensity levels have ranged from 85 to 110 decibels (com.). This shows a great disparity, but it emphasizes the inadequacy of describing the harmful effect of a sound in terms of its loudness alone.

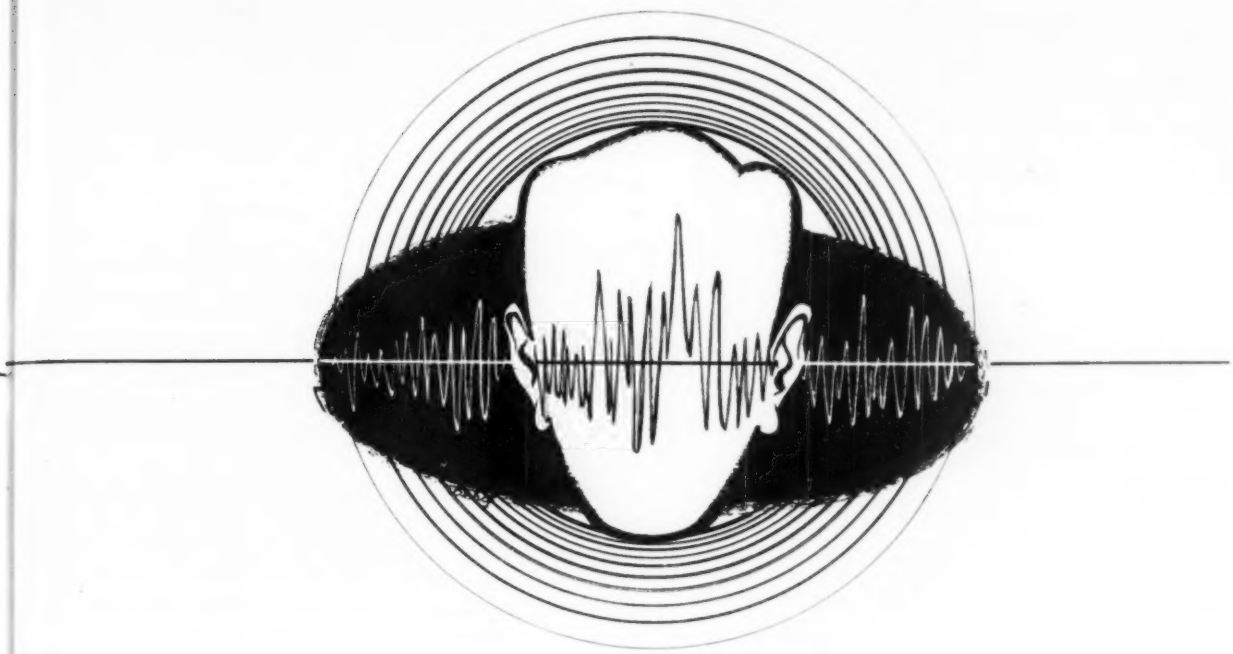
Although most investigators believe that only intense noise in which the higher frequencies predominate is harmful to hearing, evidence is accumulating that intense low frequency noise may also be harmful. The chief reason for these contradictory experimental conclusions is the extremely complex nature of the science of sound and of the sensitivity of the human ear.

There are at least three or four essential phases in establishing an industrial hearing conservation program: the evaluation of the industrial noise, preplacement audiometry, post exposure audiometry, and also the correlation and integration of the data obtained from each of these. Each phase deserves careful consideration.

Classification of Noise

In the first place, industrial noise may be divided into several important classes with different capacities for affecting the organ of hearing. One such classification is the steady-state noises, such as jet engines and motors, and intermittent noises, such as sharp bursts of gunfire, chipping, and riveting. Another classification depends on whether the noise has most of its energy in the lower or the higher frequencies. Examples of the former are reciprocating engines and many large industrial presses; examples of the latter are certain jet engines and high pressure steam machines.

It becomes necessary, therefore, to find more defining characteristics of a sound than its loudness alone to be able to describe its effect upon hearing. It is obviously insufficient to say that a sound whose intensity is 110 decibels will produce hearing loss. This may be true if the sound is a sharp burst with most of its energy in the



higher frequency range, but it may not be true for any other type of noise of the same intensity.

Properties of Sound

At present, it is essential to determine several properties of a sound to describe its potential effect upon hearing. These are: (1) the over-all loudness of a sound, which may be obtained with a sound level meter directly, or calculated from a sound analyzer; (2) the spectrum of a sound, that is, the relative intensity of the various frequencies that combine to produce the sound; and also (3) the source and time relation of the sound, such as from a gun, metal hammer, and intermittent continuous sharp blasts. All of the data are needed for research purposes, so that accurate conclusions may be safely drawn concerning the hazardous effect of noises upon hearing.

From evidence we have accumulated during the past five years in Philadelphia, the following impression has become apparent. Personnel exposed to certain types of jet noise whose intensity may reach 110 or more decibels have not shown evidence of significant hearing impairment even after many hours of daily exposure for at least 5 years. At present, this impression applies only for this specific type of noise.

Measurement of Noise

According to present thinking, a satisfactory practical approach to the problem is to evaluate all intense noise in our individual plants. This can be done by first measuring the over-all intensity with a sound level meter. I personally believe it is safe to conclude that any noise in which the over-all level is less than 100 decibels is safe to practically all ears. If the over-all level is above 100 decibels, the noise should be considered potentially hazardous and investigated further. This is done by obtaining a spectral analysis either with an octave band analyzer or a panoramic sound analyzer.

It is important that both the intensity and the frequency determinations should be measured in relation to the placement of personnel and not the source of the sound. It is also important that the sound level meter be placed in an area where the readings will not be influenced by vibrations.

Preplacement Tests

This brings us to the second phase in the establishment of the hearing conservation program; that is, preplacement audiometry. A long range hearing testing program should be initiated on all present and proposed personnel who are exposed to potentially hazardous sound. The hearing testing should be done with a calibrated audiometer in a quiet room. The resultant audiogram, unfortunately, is not always an accurate picture of the subject's hearing acuity because of the many variables inherent in the performance of this test.

It is essential to check the calibration of an audiometer every day it is used. In some audiometers a calibration dial is present to match the instrument against a 60-cycle line hum. It is best, in addition, however, to test all frequencies on a number of known normal ears each day.

The technique of doing an audiogram is most important. The tester must be well trained and be able to recognize all possible errors and appreciate his responsibility. It is essential that tests be conducted in a room in which the noise level remains reasonably stable and

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is not loud enough to interfere with threshold determinations. The sound level meter may be used in determining the efficiency of the testing room.

One audiogram is inadequate. This fact is extremely important from the medical-legal aspect. We have encountered a number of situations in which the first audiogram on a subject showed normal hearing. On retest by another audiologist, the audiogram revealed as much as 50 or 60 decibels loss in several frequencies. Obviously, if only one audiogram were done on these subjects, after several weeks of exposure to noise, a retest would show a severe hearing impairment, and the situation would assume a significant medico-legal character. The importance of doing repeated audiograms that are consistent with one another cannot be overemphasized, both from a legal aspect and from a research aspect.

The hearing of an individual fluctuates markedly, particularly if he is exposed to intense noise. An audiogram done at the end of the day's work may show a hearing loss, whereas, the same test in the morning may show normal hearing. Since the performance of an audiogram requires a response from the subject, the speed and manner of presenting the pure tones are quite important. The subject must be familiar with what he is expected to hear and do.

These few points explain why three distinct testers may get different audiograms on the same subject even under standard conditions.

It is redundant to mention that prior to testing, the ears should be examined to rule out impacted cerumen, infection, or other obstructions. A brief history should be taken of the individual's previous exposure to industrial noise and gunfire. The preplacement audiograms are significant primarily in establishing a baseline to determine any hearing change that may ensue during the course of the individual's employment.

Post Exposure Audiometry

This brings us to phase three of the program: Post exposure audiometry, probably the most important aspect of the program. The same precautions of hearing testing previously described are applicable here. All employees exposed to noise classified as potentially hazardous should have hearing tests done at least once a month for 6 months. Experience has shown that an employee who is susceptible to acoustic trauma will show evidence of hearing loss during the first few months of exposure. If repeated audiograms reveal that a certain area is causing significant hearing loss in a number of employees, that area should be classified as hazardous. It should be brought to the attention of the safety engineers and remedial measures initiated.

In addition to all the complex situations just described, further complications are introduced by the fact that some ears are much more sensitive to injury from noise than others. As yet, we have no reliable test to detect these sensitive ears, but considerable work is being done in this direction. It is the general con-

sensus that acoustic trauma is not accumulative, and also that if an employee is removed from his noise environment much of his temporary hearing loss may clear up.

The recovery period may take a number of weeks according to some authors. It is generally accepted that a person with nerve deafness of certain types is more susceptible to auditory fatigue and acoustic trauma than a person with normal hearing. Some recent work at our laboratory suggests that this is not always true. We believe that further investigation in this direction is essential.

From an address presented at the U. S. Navy Fourth Annual Industrial Health Conference.

Sodium Data Sheet

PROPERTIES of sodium and information on its safe handling and use are given in Chemical Safety Data Sheet SD-47, "Sodium, Sodium Metal, Metallic Sodium," published by the Manufacturing Chemists' Association, Inc.

Both in its solid and molten forms sodium presents a number of potential hazards, which should be thoroughly understood by workers who come in contact with it.

Among the principal precautions set forth in this Data Sheet are: avoid contacts with water, avoid contact with chlorinated hydrocarbons and solid carbon dioxide; avoid use of fire extinguishers containing carbon tetrachloride, water or acids; avoid using steam on sodium fires or for heating sodium reaction vessels; keep untrained personnel out of areas where sodium is handled.

The data sheet describes authorized shipping containers for sodium, proper housing of tank cars for loading or unloading the molten metal, and recommended storage facilities.

Instructions are also given on handling of fires and the disposal of residues and scrap metallic sodium.

In the presence of moisture, sodium causes thermal and alkali burns on unprotected skin or eyes. Recommendations for safeguarding employees who handle sodium are given, as are first-aid measures to be used in case of contact with the material.

Copies of the Data Sheet are available at 25 cents each, remittance with order, addressed to Manufacturing Chemists' Association, Inc., 15th and H Streets, N. W., Washington 5, D. C.

New Methods of Artificial-Respiration Depicted In Film

THE Coast Guard has unreeled the first government film designed to teach new back-pressure methods of artificial respiration.

The 11 minute film depicts the back-pressure and arm-lift, and the back-pressure and hip-lift methods of

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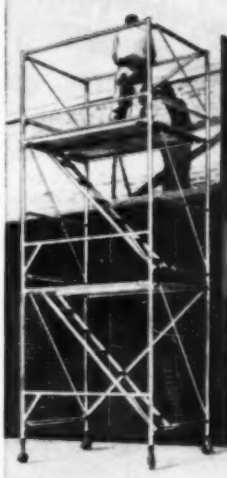

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artificial respiration. Both were recently adopted by the Department of Defense, U. S. Public Health Service, American National Red Cross, and other organizations. It demonstrates the two systems which are used in all cases of suspended breathing, such as drowning, electrical shock, swelling of the mucous membranes in the nose and throat following inhalation of live steam or irritating gas, foreign body in the oral passages, constriction around the neck or lack of oxygen from any cause.

The new film will be available to television stations, government agencies, and industrial and educational organizations for group showings. It may be borrowed from Coast Guard Headquarters, Washington 25, D. C., or one of the district Coast Guard offices located in Boston, New York, Miami, St. Louis, New Orleans, Cleveland, Long Beach, San Francisco, Seattle, Juneau, or Honolulu.

Water Purification Unit

THE Army's new truck-mounted electrical water purification unit, which is capable of treating, clarifying, filtering, purifying and distributing 2,400 gallons of water an hour in temperatures as low as 40 degrees below zero, was demonstrated before defense and city officials at Richmond, Virginia, recently.

The unit, which can easily be transported on a cargo-type plane to combat zones, contains several inventions and numerous developments resulting from years of basic and applied research at the Engineer Research and Development Laboratories, Fort Belvoir, Virginia.

Heart of the unit is an ultra-high rate solids contact water conditioner called an erdlator. This device is connected in series with diatomite filters, and the combination not only removes silt and destroys bacteria, but also provides positive physical barriers to the passage of organisms which cause dysentery and schistomiasis, a serious water borne disease found in the Far East.

Polluted water can be pumped into the unit and chemically and physically treated and discharged as potable water in approximately 20 minutes. Its excellent performance and short detention time is attributed to the use of a material which is almost universally available and costs less than $12 a ton.

Only one man is required to operate the unit and it can be put into operation by three men in less than 90 minutes after arrival at a selected site. Equipped with its own power source, it can be operated in total blackout. The only noise audible is from the engine driving the generator.

The Virginia State Department of Health cooperated with the Engineer Research and Development Laboratories in conducting engineering tests. The recent demonstration was the last lap of a five-site test program suggested by Mr. Richard Messer, Director of the Division of Engineering, Virginia State Department of Health.

THE INDUSTRIAL Nurse

EDITOR
ROSAMOND J. WEBSTER, R.N., A.M., Ph.D.

British National Health Service

MANY people in medicine, nursing, public health and industrial medical service often talk about British health service as it is currently administered. Sometimes their opinions are biased, either for such a system or against it. There is now in this country an associate health officer of the Baltimore City Department of Health who was for many years a distinguished health officer in London. In an address delivered at Johns Hopkins University a few months ago he summarized his observations of the British system. The full article appears in the October 1952 American Journal of Public Health.

Here are some of the points made: (1) The main principle of a comprehensive medical care service, available to all and free at the time service is needed, is accepted by all political parties and by the representatives of the medical profession. (2) Every sick person has direct access to the general practitioner of his choice. (3) The doctor who desires a specialist opinion on any of his cases can receive it even if it involves the specialist visiting the patient's home. (4) Former voluntary hospitals have been saved from bankruptcy. Former municipal hospitals have had their staffs strengthened. (5) All hospital extensions and developments are coordinated and made to fit a regional plan. (6) The development of the hospital service is hampered by the present national financial stringency and by the shortage of nurses. (7) There is still a substantial amount of private consulting and operative practice. (8) The development of group practice and health centers is an agreed policy incorporated in an act of Parliament. Progress is very slow in this area, owing also to the national financial stringency. (9) Some progress is being made in better distribution of general practitioners. (10) Most of these men are dissatisfied with their incomes; though there are exceptions, especially in industrial towns where hospital services are usually good. (11) Former private practices of general practitioners have been substantially reduced. (12) As a class, public health officers are unhappy, and as a result, the number of public health graduates is diminishing. These are some findings by a highly qualified observer. Whether such a system or a similar one is desirable or even practical in the United States is an open question.

Industrial Noise and Impaired Hearing

A RECENT issue of the Journal of the A. M. A. carried an editorial under this heading. It pointed out that although noise has long been tolerated in industry as a necessary evil, a growing awareness of its manifold implications has been expressed recently in medical, industrial, legal and labor circles. The fact that noisy industrial surroundings reduce efficiency has received comparatively little attention, even though it has been demonstrated that noise reduction pays substantial dividends in terms of higher output, worker safety and improved morale among employees. Actually, noise costs money, because authentic claims for hearing loss due to industrial noise are often compensable. Claims for damage due to impaired hearing have been made through common law actions on the basis of alleged negligence.

In view of the inability of medical and surgical therapy to restore permanent hearing loss due to noise, a cardinal objective at present is to institute protective measures in industry and to conserve the hearing of employees and others engaged in activities on the industrial scene. In order to achieve this goal, the cooperation of employees, management, the industrial medical department, safety engineers and others is required.

Recommendations for action include: (1) Surveys of noisy industrial areas. (2) Pre-employment audiometric and otalgic studies of employees. (3) Audiometric studies of employees exposed to hazardous noise. (4) The establishment of quantitative standards for evaluating hearing loss. (5) Use of preemployment selectivity tests to discover noise-susceptible individuals. (6) The development of procedures to reduce or elimi-

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nate noise by redesigning machinery, and, insofar as the medical and nursing departments in industry are concerned, by the use of suitable ear plugs and ear defenders. These should be distributed by the industrial nurse, and periodic checks made to see that the workers are actually using them.

A Reminder

INDUSTRIAL nurses, as well as their professional associates in medicine, industrial hygiene and safety engineering, occasionally need to take stock of their objectives and the means at their disposal to achieve them. Such a stocktaking may serve as a gentle reminder that there are specific codes relating to each area of service to industrial workers, even though such codes cannot, in the nature of things, be taken as absolutes. A distinguished American leader in public health, preventive medicine and industrial hygiene, defined the latter field as one of the most important areas in preventive medicine and hygiene, because industrial hygiene deals with the health, welfare and human rights of the vast majority of the adult population. The prime object of industrial hygiene is to protect the health of the worker, wherever he labors.

Another object is to prevent industrial diseases. In this case the control of special health hazards is not enough. Industrial poisons and harmful dusts, ventilation, temperature, humidity, light and noise, plant sanitation, overcrowding at work places, fatigue, protective devices, safety shoes and clothing, control of communicable diseases and provision of industrial nursing and safety engineering facilities—all these are incorporated under industrial hygiene. In the United States, the Public Health Service, state departments of health, state departments of labor in some instances and local departments of health are all interested in industrial hygiene and protection of the health of workers. Professional workers are assigned by most of these governmental agencies to assist employers in dealing with some of the problems that inevitably arise in industry.

The industrial nurse might make a check list of all these items and follow through to learn how well she is performing in the area of industrial hygiene, and how high her medical department rates in her own opinion.

The Bill

WHAT is the bill for fatalities and major industrial injuries on the American industrial scene? The President's Conference on Industrial Safety estimated that in 1948 there were 16,500 fatalities in industry and related fields; 1,800 total, permanent disabilities; 83,700 partial, permanent disabilities; 1,858,000 lost-time temporary disabilities; and 41 million man-days lost from accidents. This is a terrific price to pay, and yet many of the largest establishments show an excellent record, with rarely a fatality, and weeks or even months without a major accidental injury or occupational disease. It is well known that plants with competent medical, nursing, safety and educational programs often show the lowest accident rates and number of man-days lost due to injuries. It is the small plant, which does not or cannot economically maintain such staffs, that tends to show the highest accidental injury rates. However, for the benefit of the national economy as well as the welfare of individual workers and their families, this kind of plant cannot be ignored.

The International Labor Organization through its Committee on Industrial Safety and Health has prepared a statement on this matter. It reads, in part: "In the protection of the workers against occupational risks, health and safety are complementary to each other. If one envisages on the one hand the prevention of occupational diseases and on the other hand the prevention of occupational accidents, they are two aspects of one and the same problem, which has as its object the safeguarding of the health of the workers. In fact, whether it is a case of an accident or an illness, the consequences in each case are an impairment of health." It is this impairment which all in medical service and preventive work in industry aim to eliminate. The huge toll of lives and injuries, of wages lost, production interrupted, other workers thrown off the job and the huge medical costs add up to a frightening total. The challenge is there to all concerned—including employers and, of course, workers themselves, whose own carelessness may often be at the root of the problem.

Manpower Policy Committee

THIS committee is composed of top-level labor and management representatives who serve as policy advisors on manpower to the Office of Defense Mobilization. One of its major concerns is the prevention of industrial injuries, and all interests concerned have been asked to cooperate in this important effort.

Among the recommendations of the committee are that: (1) Employers and workers should intensify their efforts to achieve full cooperation in preventing job disabilities and (2) Employers should recognize that safety is their legal and moral obligation and take the following steps to prevent job injuries: (a) Provide for a safety program and take positive steps to carry out that program. (b) Make accident prevention a definite executive responsibility and assign a full-time safety director where practical. (c) Investigate all accidents to prevent recurrence, keeping and analyzing accident records. (d) Provide safe plants, machinery, and equipment. (e) Place no new machinery or equipment in operation unless it has been checked for safety. (f) Plan and arrange all processes and operations with careful regard for safety. (g) Maintain a system of inspection to discover correctible hazards. (h) Train and maintain safety-minded supervisors. (i) Train and stimulate employees to follow safe work methods and take an active interest in their safety and that of their fellow workers. (j) Make a full report of accidents to appropriate authorities. Following these precautions could be a big step in reducing the high toll of accidents.

Evidently, all plants do not have a safety engineer on their staffs. It is not possible nor would it be desirable to have industrial nurses try to perform his functions, but there are many ways in which nurses can help: by careful observation of working conditions and by questioning injured and ailing workers when they report for first aid or other care. Passing on information gathered in this way to immediate superiors will help, even if it only prevents one accidental injury.

Sizing Up The Situation

THE widely recognized shortage of nurses in hospitals, clinics, public health and industry has led the National Security Resources Board to ask the American Nurses Association to estimate the number of nurses currently needed in various fields. The study was undertaken with these objectives: (1) To determine the scope of nursing activities in sample plants. (2) To apply a time study method for determining nursing time spent on nursing functions and related activities. (3) To secure additional information useful in formulating a methodology for determining the number of nurses required to meet employee health service needs.

The industrial hygiene bureaus of the Georgia and Connecticut state departments of health were invited to cooperate and to select plants for the study. A total of 12 plants in these states were studied, each for a period of 7 working days.

The findings were: (1) Direct services accounted for 43 percent of the nurses' time; indirect services for 29 percent; and all other activities for 28 percent. (2) As the size of the plants increased, the percent of the nurses' time spent on direct services increased and the average number of minutes per service decreased. (3) There was wide variation in the way nurses' time was utilized, even in plants of comparable size. There was considerable variation in the demand for services from employee groups. In a plant with 300 employees, 46 services were rendered in connection with injuries, medical complaints and health examinations. In another with 363 employees, 190 services were rendered. (4) In the area of indirect services, there was also considerable variation. This was probably due primarily to the size of the employee population, differences in the scope of the health program as they affected the functions of the nurse, the amount of clerical and housekeeping assistance available, and managements' attitude towards the industrial nurses' functions.

Individual studies can be undertaken by working industrial nurses. A check on how they spend their time may help increase their own efficiency.

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(Use Key # 683 on Inquiry Card on page 83)

A COMBINATION of extra-long leather fingers and a ⅝" steel ball stitched securely into the end of each finger in The Boss Manufacturing Company's new glove protects all four fingers of a worker's hand in the same general way that safety shoes protect toes against painful costly accidents.

The new glove is especially designed for handling heavy metal sheets and shapes. Two styles of gloves are available—No. 1501 with a 5" gauntlet cuff and No. 1502 with a 2½" safety cuff. Both styles have full-leather fingers cut extra long to give fingers room.

PLASTIC SAFETY GOGGLES

(Use Key # 684 on Inquiry Card on page 83)

THE new AO 481 Safety Goggle, introduced by The American Optical Company, incorporates changes over previous models. It provides frontal and lateral protection through a clear plastic lens and transparent, green, vented binders which fit snugly to the face.

It is of the same construction as the AO 479 (all clear) and AO 480 (all green) Goggles, but is a modified version, in which the wearer has a clear view in front and can readily see to the side though his eyes are shielded against glare by the green coloring of the transparent binders. The goggle is available on special order.

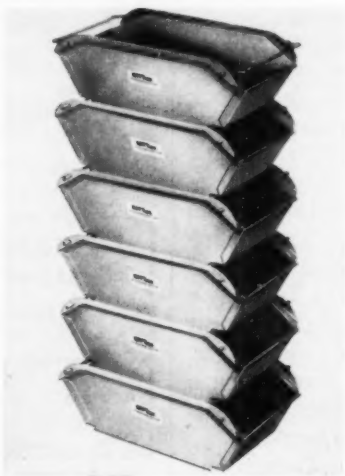
It gives protection over a wide area against flying particles and spattering chemicals in many operations, including light machine and hand-tool work, chemical laboratory work, spot welding, light grinding and other similar tasks.

MATERIALS HANDLING BOX ENGINEERED FOR SAFETY

(Use Key # 685 on Inquiry Card on page 83)

IN THE plant of The Chas. Wm. Doepke Manufacturing Company engineers became acutely aware of the delay and danger resulting from use of old-fashioned shop boxes. They applied themselves to the problem, and developed the NesTier System of materials handling, using a receptacle for handling small parts that fills these requirements: (a) Greater safety. (b) Saving of space and time. (c) Ease of handling. (d) Visibility and accessibility of parts. Empty boxes nest to save space, yet bails prevent complete telescoping and permit easy and sure separation of units as they are needed. Filled units tier, and lock themselves together to form safe, rigid stacks—with all parts visible and easily accessible.

Because of its strong construction and its particular design, it can be used on lift trucks, dollys, caster trucks, roller and overhead conveyors and permits easy, safe cartage by hand. Stacks cannot slide, tip, or rock and all parts can be seen, which eliminates lifting and moving operations. The bails allow operators to lift the unit easily and safely, even with wet or greasy hands. Because of the bails a worker is not forced to assume awkward or strained positions in lifting or carrying. Despite their extreme strength, they are light in weight, and may be moved with a minimum of exertion, can be handled safely and easily, even by women operators. The boxes are available in two standard sizes, and in a variety of colors and finishes. Bails are ¼" steel rods, permanently attached.



FIBER GLASS SAFETY HAT

(Use Key # 686 on Inquiry Card on page 83)

THE new SAF-HED-HAT now being manufactured by the United States Safety Service Company is a rugged safety hat that is light in weight and comfortable to wear. Fiber glass is said to offer the greatest strength-weight ratio of any material currently being used in the manufacture of safety hats. Fiber glass, a highly resilient material, will not split, crack or deform which makes it a highly desirable material for safety hats. The manufacturers claim it meets the A.S.A. code for dielectric breakdown and exceeds the A.S.A. code for impact resistance. The cradle of the hat can be quickly and easily adjusted to fit all head sizes and complies with federal specifications. It is further claimed that, due to the durability of fiber glass material, this new safety hat will wear twice as long and cut costs in half.

FLOOR SWEEPER WITH VACUUM DUST CONTROL

(Use Key # 687 on Inquiry Card on page 83)

A VACUUM feature has been added to Parker Industrial Sweepers to prevent the lighter dust agitated during the sweeping from blowing through the air and collecting on surfaces above the floor level. Designed to produce a vacuum proportional to the sweeping speed, the vacuum unit is driven by a gear train attached to the sweeper's wheels. This action produces a vacuum sufficient to capture the lighter particles of dust which are collected in a cloth bag. The trash, chips and litter are collected in a hopper.

The vacuum feature is available on both the man-operated sweeper, for congested areas, and the self-propelled motorized sweeper, for larger floor areas. In addition, the sweeper is rubber-sealed to the floor to prevent dust from seeping from under it while it is in operation.

PLASTIC WALL COATING

(Use Key # 688 on Inquiry Card on page 83)

A NEW protective, easy-to-wash coating for interior walls based on Vinylite resins and applied by spraying is now available. This resin-based coating resists moisture, steam, mould and mildew, oils, fats, grease, ink, salt spray and most chemicals. Resistant also to abrasion and scuffing, the coating, made by Progressive Industries, Inc., increases in strength the thicker it is applied. Thickness may vary without changing appearance of the coating, permitting extra protection for areas exposed to heavy wear. Textures resemble leather grain, and colors can be matched for integration with general color schemes. Repeated washing does not affect thickness or appearance of the coating, which can be cleaned with soap and water.

Sprayed directly on walls of cinder block or concrete block, the continuous coating completely seals the surface. This combination offers a functional and attractive yet economical wall for many building purposes, such as a small factory and adjacent office. Webbing characteristics of the resin-based material enable easy closing of holes, cracks and gaps in a surface during the spraying process.

CARBON DIOXIDE EXTINGUISHER

(Use Key # 689 on Inquiry Card on page 83)

RANDOLPH LABORATORIES, Inc., has produced a new, portable 12-pound carbon dioxide fire extinguisher. The new "12" is a compact, lightweight unit, designed especially for the average employee. It features a thumb-trigger release, and a new, lightweight, 9-ounce nozzle. With no valves to turn or regulate, the unit gives protection against panic.

The extinguisher contains 12 lbs. of non-toxic, non-damaging carbon dioxide, and is especially adapted to smother flammable liquid and electrical fires. Approved by Underwriters Laboratories, in tests the extinguisher, stopped a 2 gallon, 16-foot gasoline fire in 8 seconds.

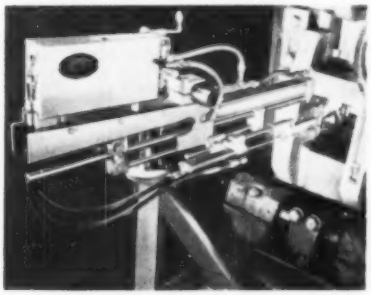
GLARE-REDUCING LUMINAIRE

(Use Key # 690 on Inquiry Card on page 83)

AN INDUSTRIAL luminaire which provides more comfortable seeing conditions by means of an upward component is now available from the Westinghouse Electric Corporation. It uses two slimline lamps of 38, 58, or 75-watts each. The upward component, which distributes 23% of the light towards the ceiling, eliminates the severe contrast between bright luminaires and dark ceiling.

Styled for heavy industrial use, the luminaire provides the upward component by slots located over the lamps on each side of the reflector. The all-white hood

is heavily ribbed in order not to lose strength due to the introduction of the slots. The porcelain enamel reflecting surface is one piece and is easily removable for cleaning. It uses the new lead-lag slimline ballast. Back to back lamp spacing is provided, and adjustable slide action hangers are available. Also available is a longitudinal shield to provide 27-degree shielding.



PORTABLE PRESS UNLOADER

(Use Key # 691 on Inquiry Card on page 83)

THE Sahlin Engineering Company, has introduced a new portable unloader which can be wheeled up to small and medium size presses for automatic removal of small parts. The machine, which consists of a jaw, air cylinder and electric control assembly, can be adjusted up and down to reach various die levels and be set at any angle required. Jaw travel is in a straight line and is especially suited for the removal of small parts at high speed. Due to its portability, high speed and safety features, the new unloader is expected to find wide usage on applications where it is impractical to eject parts mechanically or through a bed opening or by gravity.

Operation of the new unloader is as follows: When the ram descends and completes the forming or shearing operation, the steel jaw moves into the die and takes a firm hold on the stamping the moment the ram rises sufficiently. The jaw lifts stamping moves back out of the die and drops the stamping in a tote box or on to a conveyor. It then returns to its original position to await the next cycle. Gripping jaw designs of various types are available for a variety of special unloading conditions. They include a hook type for application where a gripping edge is lacking; a neoprene-tipped grip to protect parts with special finishes; a pivot-type which can be swiveled laterally to clear tight die areas; and a confined type which locks a vertical flange stamping without damaging edges.

PLASTIC EYE SHIELD

(Use Key # 692 on Inquiry Card on page 83)

AN ALL-PLASTIC eye shield, weighing 1¼ oz., that provides eye protection in semi-hazardous operations has been developed by Bausch & Lomb Optical Co. Shown on model above, it has a flexible, one-piece curved acetate lens which can be replaced by bending and snapping it in or out of place. Called BAL-spec, the shield can also be worn over regular or corrective safety glasses to prevent lens pitting and scratching. Available in crystal clear or green acetate for glare protection, lens conforms to U. S. Bureau of Standards requirements.

TRUCK-FIRE EXTINGUISHER

(Use Key # 693 on Inquiry Card on page 83)

SPECIFICALLY designed to meet the new ICC standards on fire extinguishers for the trucking industry, a new 1½ quart version of the "Redi-Grip" stored pressure extinguisher is now being shipped by Stop-Fire, Inc., Brooklyn, New York. The extinguisher can be operated with either air or nitrogen as the pressurizing agent. Either carbon tetrachloride or chlorobromomethane may be employed as the extinguishant.

In addition to the 1½ quart capacity now required for all truck extinguishers, the extinguisher offers special economy features for the trucking industry: (1) no need for annual recharge, (2) simple recharge—any driver can recharge the air operated unit at any garage or depot without special tools, and (3) corrosion-resistance that removes need for extinguisher replacement. The extinguisher may be brought into play with one hand. The extinguishant is held under a constant pressure of 150 psi and is discharged by a simple, one-hand squeeze-grip, trigger-release action.

IMPROVED EAR VALVE

(Use Key # 694 on Inquiry Card on page 83)

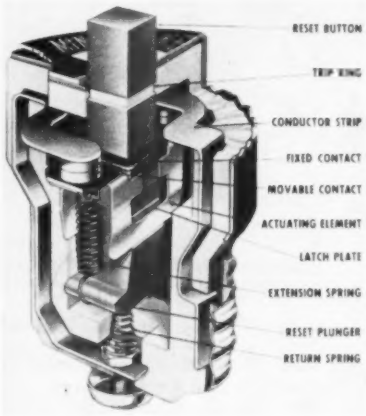
AN IMPROVED "Sonic Ear-Valv" made possible by a new silicon rubber ear insert tip is now available, according to Sigma Engineering Company. The valve is a mechanical ear protector which acts as a protective ear drum by removing loud noise while permitting the ear to hear ordinary voice level sounds.

The new silicon rubber tip developed for the valve offers many advantages over the original gum rubber tip by being softer and more comfortable to wear. It is said to endure extremes of heat and cold and is resistant to skin oils and ear wax.

SAFETY HELMET LINER

(Use Key # 695 on Inquiry Card on page 83)

A NEW winter liner for wear under safety helmets in cold weather has been announced by Industrial Products Company. Worn separately, it does not attach to the helmet. Made of soft, close woven woolen material, it fits snugly over the head, neck and ears and is provided with tape ties for fastening under the chin. Made in three sizes.



NEW CIRCUIT BREAKER

(Use Key # 696 on Inquiry Card on page 83)

"MINI-BREAKER," a new permanent type circuit protective device that fits like a fuse in any standard Edison base fuseholder delivering up to 125 volt A. C. service, has been developed by Mechanical Products Inc. It requires no additional equipment and no special wiring when applied to branch or main circuits of corresponding 15, 20, or 30 ampere ratings. It can be installed quickly, and electrical service can be restored simply by pressing in and releasing its shock-proof reset button.

The circuit breaker is said to be the only one of its kind ever to meet all the essential design, safety, and performance requirements established by Underwriters' Laboratories, Inc. Under normal line conditions electric current passes through the conductor strip and the thermostatic bimetal actuating element, which carries a pair of movable contacts. On a direct "short" or a sustained overload, however, the excessive heat generated causes the bimetal element to bend away from the latch plates on both sides of the center reset plunger. A preloaded return spring then forces the plunger outward, while twin extension springs pull the element and the movable contacts away from the fixed contacts—thus breaking the circuit. In the "tripped" position, the grooved trip ring around the reset button is exposed, indicating that the circuit is broken.

Although service can normally be restored within 10 seconds after an interruption merely by pressing in and releasing the reset button, the circuit breaker will not maintain a circuit that has not been cleared of the condition that caused the interruption. Any attempt to reset the device against an overload or "short" only results in increasing the speed of tripping. Designed primarily for direct fuse replacement use on existing residential, commercial, and industrial circuits, the circuit breaker may also be applied as original circuit protective equipment in new buildings as well as on electrically operated machines and appliances, according to the manufacturer.

FREE BULLETINS & CATALOGS

As a convenience to executives, these new publications of manufacturers are offered by the Reader Service Department of SAFETY MAINTENANCE & PRODUCTION. To obtain copies write in the key numbers on the free-postage card below.

PERSONAL PROTECTION

Safety Lenses 350
United States Safety Service Co. An illustrated folder describing and illustrating various types of safety lenses, ranging from hardened safety glass to impact resistant plastic. Included are welding lenses and plastic and glass cover plates. Hazards against which the lenses furnish protection are explained and varying shades of lenses are also given.

Chemical Resistant Clothing 351
Mine Safety Appliances Co. A new line of shirts, trousers, and coveralls of acid, caustic, and corrosive resistant fabric is detailed in this bulletin. Now produced in gray, to make stains and soil less noticeable, the line includes lightweight shirts and sizes for men over six feet. The fabric is also resistant to wear, mildew, moths, shrinkage, and snagging and tearing.

Eye Wash Fountain 352
Haws Drinking Faucet Co. A 3-page bulletin illustrates and details several models of eye-wash fountains and emergency showers. Designed for installation in working areas the fountains furnish immediate first-aid and can be pedal-operated even by a temporarily-blinded worker. The fountain delivers two streams of water to wash out any foreign matter in the eye.

Flexible Work Glove 353
Arcadia Mfg. Co. A general work glove coated with an elastic compound to provide flexibility at different temperatures is described in this 1-page bulletin. The coating is designed to resist flame, oil, acids, and alkalies, as well as to give longer wear.

Wooden Orthopedic Shoe 354
Reece Wooden Sole Shoe Co. An illustrated folder covers several types of wooden-soled shoes designed to protect a worker's injured foot. A canvas upper that provides firm but comfortable support is attached to the sole. A steel guard is provided in some styles. Also listed are shoe sizes.

FIRE PROTECTION

Magnetic Separators for Grain Mills 355
Eriez Mfg. Co. A new 6-page brochure shows the use of magnetic separators in the grain and feed milling industry to remove tramp iron from the product. The magnets prevent spark-caused fires and protect machinery when installed on feed chutes, pellet mills, hammermills, attrition mills, etc.

Dry Chemical Extinguisher 356
Stop-Fire Inc. A 2-page bulletin describing a new dry-chemical extinguisher, includes performance data and covers types and weights available. The nitrogen-pressurized unit is said to be non-clogging. The bulletin also details the features of a new non-caking dry chemical extinguishant.

Oily-Waste Can 357
Protectoseal Co. Presented in this 2-page bulletin are details of new waste can designed to contain oily wastes safely. Features include welded construction, ventilation, easily opened and closed cover, carrying handle and foot pedal for opening can when hands are full. Specifications for 4 different size cans appear in the bulletin.

RADIATION PROTECTION

Survey Meters and Instruments 358
Tracerlab Inc. An 8-page condensed catalog and price list illustrates and describes a line of scalers, amplifiers, sample holders and changers, survey meters, geiger-mueller tubes and accessories, scintillation equipment, sample preparation equipment, sources and chemicals and safety equipment for work with radioactive substances.

Radiation Protection and X-Ray Accessories 359
Bar-Ray Products Inc. This 72-page catalog has comprehensive sections on x-ray and nuclear protection, such as garments of lead-glass fabric, industrial inspection units, radioisotope fume hoods, conveyors, laboratories and many other safety devices. It also deals with processing tank combinations, through-the-wall processing systems, special tanks, water coolers and dark room accessories. Liberally and clearly illustrated, the catalog also thoroughly describes each product or device.

FLOOR MAINTENANCE

Safety Treads 360
Wooster Products Inc. A file folder containing 28 plates of details on abrasive cast and safe groove treads as well as expansion plates, platforms, curb bars and floor grids. Designed to provide detailed information quickly to architects and designers, the file-folder includes full-size cross-sections of the various types of safety treads in addition to dimension drawings and typical installation and mechanical specifications.

Floor Maintenance Machines 361
American Floor Surfacing Machine Co. Illustrated and detailed in this 4-page bulletin is a line of floor maintenance machines including sanders, polishers, waxers, edgers and portable tools and maintenance devices. Specifications are presented and several floor finishes described.

Floor Cleansers 362
Virginia-Carolina Chemical Corp. A 6-page folder describes several different cleansers for cleaning concrete floors, driveways, locker rooms, machinery, tanks, furnace rooms and metal runways. Sanitizing, disinfecting, deodorizing cleansers as well as metal-cleaning acid cleansers are detailed with a run-down of their applications.

ELECTRICAL EQUIPMENT AND MAINTENANCE

Fluorescent Lamp Lock 363
Laduby Co. Inc. A non-conductive safety lock to prevent accidents from failing or faulty fluorescent lamp installation is detailed in a 4-page folder and 2-page bulletin. The locks are designed to install inexpensively and increase the efficiency of the fixture. Cross-section drawings illustrate several types of locks.

Preventive Electrical Maintenance 364
Westinghouse Electric Corp. This 28-page booklet presents a work and cleaning schedule for power machines in chart form. It also contains information on preventive maintenance for turbines, generators, switchboards, motors, controls and other kinds of electrical equipment. Designed to reduce shut-down time on production lines, the booklet gives the frequency of inspection and maintenance as well as additional precautions to be taken for specific parts of electrical equipment.

SIGNS AND SIGNALS

Safety Signs and Markers 365
W. H. Brady Co. A 50-page catalog has sections on pipe markers, wire markers, safety signs, reflective signs, masks and stencils and printed roll tape. Each product section in the catalog is tabbed separately. Covered in the catalog is the company's full-line of safety markers. Illustrations, specifications and job applications are also dealt with.

Two-Way Radio Communication 366
General Electric Co. An 8-page illustrated booklet discusses the use of two-way radio for better coordination of men and materials in industry. Designed especially for materials handling and plant protection problems, the booklet outlines a variety of applications of two-way radio communication and presents and describes several kinds of equipment.

Industrial Television 367
Diamond Power Specialty Corp. Illustrated and described in this 8-page bulletin is a wired-television unit for industrial use. Designed to allow

(Continued next page)

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Free Bulletins (Continued)

remote-control operations where direct visual checks are impossible, the television system is dealt with in detail. Included are specifications, applications, technical information and general information.

MISCELLANEOUS

Laboratory Safety 368
Fisher Scientific Co. This 48-page manual of laboratory safety contains chapters on accident prevention, first aid, fire prevention and safety equipment. A laboratory emergency chart, which contains a list of treatments for laboratory accidents, is also included. A comprehensive bibliography, covering safety hazards from industrial poisons to ventilation, also appears in the manual.

Industrial Dust Control 369
Pangborn Corp. Application and engineering data, tabulated according to types of dust and collection requirements, are featured in chart form in this 28-page bulletin on the control of industrial dust. The chart makes possible determination of probable requirements for a dust collection system. Also illustrated and described are various types of dust control equipment with their specifications and performance data.

Safety Solvents 370
John B. Moore Corp. A 4-page folder and data sheets explain and detail safety cleaning solvents, which can be used to replace carbon tetrachloride and other toxic solvents. Halogen toxicity and the safety features and specifications of three of the new solvents are discussed in the literature. Safe solvents for cleaning electrical equipment are featured.

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FIRE USE ONLY HANDS OFF
DANGER
DO NOT LOOK AT FLAME TO DO SO MAY CAUSE SERIOUS INJURY TO THE EYES
SAFETY FIRST
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CAUTION
ANY WORDING DESIRED MAY BE PLACED IN THIS BLANK SPACE AT ADDITIONAL COST
CAUTION HANDS -OFF-
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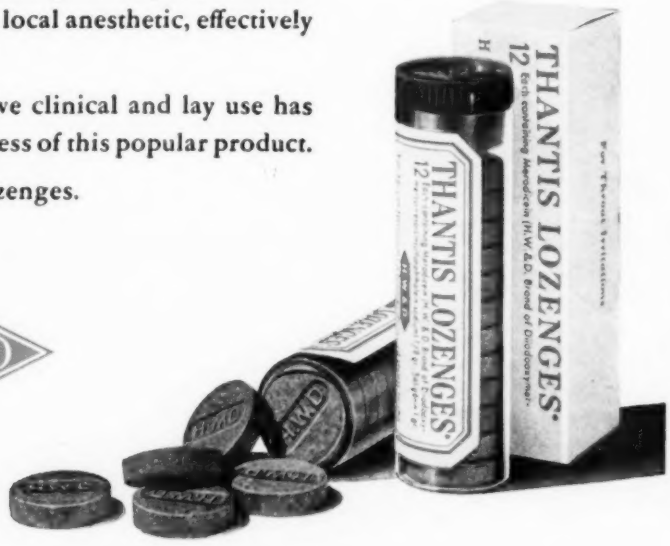

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(For full details, use Key # A-51 on free Inquiry Card on page 83)